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Contents

	Page
Fatigue Curve Test. H. C. Carlson	169
The Relationship Between Success in Physical Education and Selected Attitudes Expressed by High School Freshmen Girls. *Martha G. Carr.*	176
Analysis of Physical Fitness Index Test Scores of Air Crew Students at the Close of a Physical Conditioning Program. *H. Harrison Clarke*	192
A Historical Study of the Concern of the Federal Government for the Physical Fitness of Non-Age Youth With Reference to the Schools, 1790-1941. *A. Gwendolyn Drew*	196
Reading Difficulty Differences of Health Knowledge Tests. *W. W. Patty*	206
A Score Card for Evaluating Physical Education Programs for Physically Handicapped Children. *Julia Partington Landers*	216
A Selected Bibliography on the Planning and Construction of Facilities for Physical Fitness Activities, 1929-1944. *Louis C. Schroeder*	221
Status of the Graduate Faculty in Physical Education. *Jack E. Hewitt*	231
Research Abstracts. National Council of the Research Section	241
Book Reviews	247
Life Members	248
Editorial Policies	250
Reprints	252

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Fatigue Curve Test

By

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A TRUE physical test of function should be sufficiently demanding and searching that it will positively reveal as nearly as possible the absolute state of physical condition. Any procedure less than such a fully significant test should be classified as an indication rather than a test of condition. The fatigue curve procedure is a real test in that it can plumb the depths of condition of the tested. Any procedure which limits the output of the individual in any "slow down" can only produce an indication, rather than the near absolute appraisal of a test.

Many medical men who have not investigated it oppose the fatigue curve procedure because they think it is too strenuous and demanding. Some physical educators in schools and in the armed services are opposed to it because the participants are allowed to count their own steps and pulse rates. The real objections probably stem from lack of comprehension or familiarity, or from high sales resistance in refusing to try to carry through on a series of tests. A physicist might object that the measurement of work would not be exact. But the physiologist would take one look at the plotted curve and know relatively how well the participant had applied himself and particularly how his output of work had improved from day to day.

The generalized fatigue curve is an established and accepted physiological phenomenon. The method to be described can develop a fair evaluation of work relative to the weight of the individual. We seek no ceiling of weights to be lifted, but we do seek the ceiling in speed in vertical efforts. Spot running is the physical skill used as a medium of the test. The participant is to go as fast as possible in ten-second innings with intervening rest periods of ten seconds.

Many so-called tests restrict efforts to a certain tempo and thereby penalize the testees. Any test which imposes the same tempo of activity upon a group is bound to interfere with the efficiency of different individuals. The boys whose optimum operations are high or low will be penalized by an intermediate speed. We have a comparable analogy of the high-speed plane or the passenger engine working at a rate much too low, or the low speed plane and the freight engine tearing themselves apart in working up to a speed much too high. Restricted tempos may lead to some index but they induce results short of an all-out test.

We insist that each participant shall go "all out" each inning. We know, by experience, that ten-second innings for ten such innings will elicit proper evidence. Anyone who feels that ten innings of ten seconds each of maximum effort restricts the testee and is something less than a test should try a few innings.

The fatigue curves not only measure the work done, or *production,* but the plotted curve tells the percentage of "all out" effort, emotional drive, or *application.* Five pulse rates taken (1) before, (2) ten seconds after production, and (3) after two minutes, (4) after four minutes and, (5) after six minutes of rest will give an index of condition. The generally prevalent normal pulse rates may give some idex of condition. The degree of pulse increase in response to effort will contribute to the index. The time and degree of recovery will further enhance the index.

Any tester should be tolerant of the individual and group results in the first few tests. Starting with the very first test, however, the pattern of the plotted curves of effort and pulse rates will take on the character of the more perfect curves to be plotted later. The aggregate curves of the group in the first test should give evidence and encouragement to carry on. The individual cannot on his first test completely discount his past habits of not going "all out." In watching his fatigue curves become more regular, he will closer approach the ideal of giving his best consistently. The orientation of the physical instructor is furthered best by his plotting of, and reference to, the fatigue curve and the index curve of condition of the group.

PRODUCING A FATIGUE CURVE

The physical skill used here to demonstrate measurable efforts in a plotted fatigue curve is spot running. The individual lifts and lowers his feet alternately just far enough to clear the floor, as fast as he possibly can go for ten seconds. He counts the number of right foot contacts only, and records them for each inning of ten seconds' work. There are ten such innings with ten seconds' rest between each inning. The total number of right-foot contacts for ten innings is added up to indicate Production. Fatigue causes a drop in the repetitions of each subsequent inning if the participant is able and willing to go "all out." Any subsequent inning which fails to show fewer repetitions represents an error or lack in Application.

The weight factor remains constant throughout. There is almost no up-and-down movement of the center of gravity because of the rapidity of the steps. The work done is largely due to the overcoming of the inertia in the very fast starting and stopping of the mass of the limbs, and in the maintenance of the height of the center of gravity. Since the major element is speed, the function measured

is the time rate of work, or power—all relative to the mass of the individual. Power is the mechanical function most closely associated with fuel consumption. The power output is very closely related to the speed of action.

It appears logical that the graph of right foot contacts or repetitions of the group first, and then comparison of individual curves would illustrate Production and Application. The efforts are measured fairly accurately.

PULSE RATE CURVE

The initial pulse rate is taken before production of the fatigue curve, partly in order to get an idea of the increased costs in heart beats for that particular action. The first pulse rate is part of the pattern used to determine an index of the costs and recovery for the effort.

All pulse rates are taken with the participants sitting on the floor or ground. All pulse counts are for 10 seconds, and this is multiplied by 6. Since it is the total of all pulse rates that is significant, minor errors of counting tend to be equalized. The second pulse rate, i.e., ten seconds after production of the fatigue curve, allows for ten seconds to record the foot contacts of the tenth inning and to locate the pulse. The third pulse rate is taken after two minutes' rest and here is noted

APPLICATION

INNINGS TEN SECONDS WORK	SAMPLE 6-10-42 11 A.M.	DATE TIME	DATE TIME	DATE TIME	DATE TIME	DATE TIME	DATE TIME	DATE TIME	DATE TIME	DATE TIME	DATE TIME	TOTALS—TEN FATIGUE CURVES INNINGS INCREASE	% DAYS WITH IMPROVEMENT
First	38												
Second	37												
Third	(37)												
Fourth	36												
Fifth	(37)												
Sixth	35												
Seventh	34												
Eighth	(36)												
Ninth	33												
Tenth	30												
Total	353												
Production Subsequent decrease Tools increase daily												ENCIRCLE ERRORS ABOVE FOR AGGREGATE CURVE	
Application Improve daily	70%												

CONDITION

Weight	175												
Pulse rates		Should decrease daily with improved condition											
Before work	76												
After work	152												
After 2 min. rest	104												
After 4 min. rest	96												
After 6 min. rest	96												

the greatest period of recovery. While resting in the next two minutes, each participant adds the repetitions or right foot contacts for the ten innings of work. The fourth pulse rate is taken after four minutes of rest following the fatigue curve. They should then check their first additions. The fifth and least important pulse rate could be taken after six minutes' rest.

The participant adds his five pulse rates as an index of the *costs* in heart beats for the production of the fatigue curve. The plotted curve gives an index of the time of and the degree of recovery after work. The illustrated chart, or some modification may be used for the individual's records.

ADVANTAGES OF THE FATIGUE CURVE TEST

The test can be performed anytime and anywhere with a minimum of equipment. Only pencil and paper for the participant and a watch for the administrator are necessary.

One administrator can give the test to fifty or two hundred within ten minutes. The clerical work can be done later at any convenient time. The greatest task is the recording of the fifteen numbers for each participant. The additions, averaging, and plotting of the average aggregate curves give a good picture of the work done.

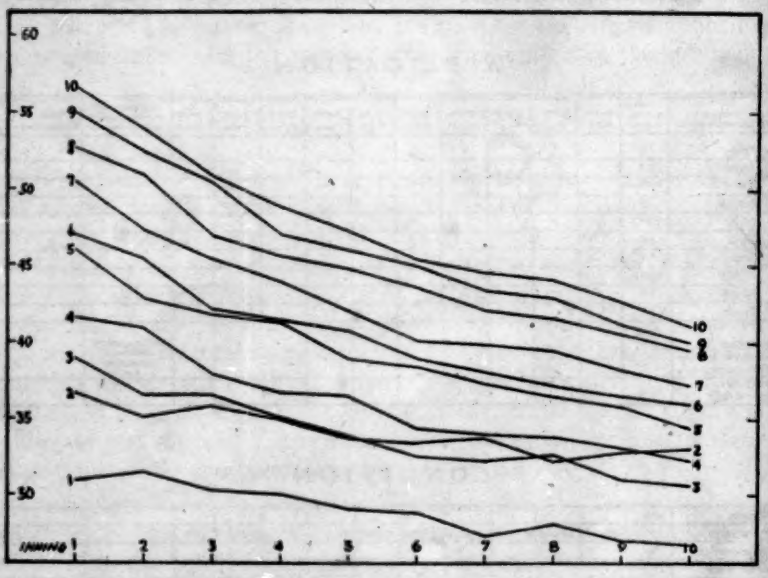

FIG. 1. (Aircrew Series—Legs) Composite Fatigue Curves Improving for ten consecutive days. Each day they said they did their absolute best and each subsequent day they found they could do more through improved training.

There is no penalty upon slow or fast boys or girls since each can produce his or her best work at optimum speed. All types can be given the same test at the same time.

The administrators and the participants will learn more physiology of training, conditioning, and emotional drive. Accurate individual evaluation becomes available.

The results are authentic. The tempo of the test allows for no meditated connivance, and recordings are usually honest even though there may be some errors. The participant cannot "figure" on holding back so as to control records and later make convenient improvements.

The test becomes a conditioning agent as well as a medium for improved mastery of the designated muscular skill. Improved application leads to both better training and increased endurance.

AN ANALYSIS OF 200 SOLDIERS

The plotted aggregate curves for ten days of 200 soldiers in fatigue curves for the days presented in the accompanying chart (Fig.

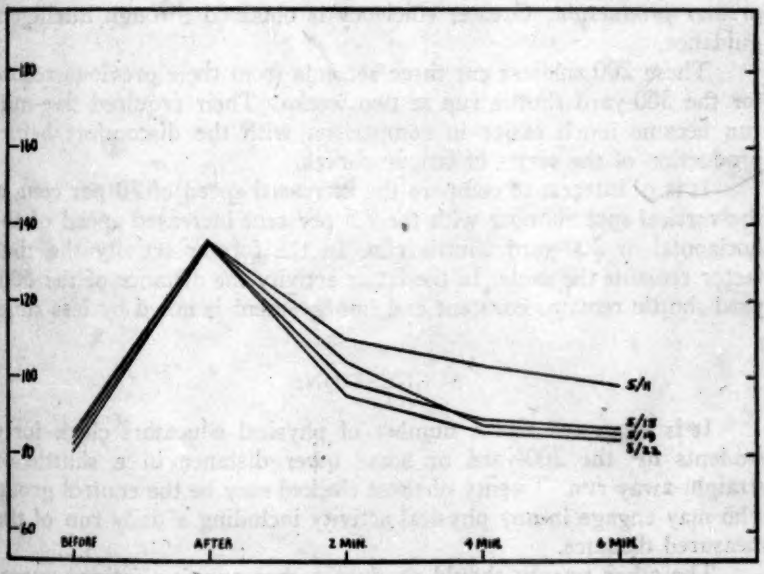

FIG. 2. Composite Curves of Condition Corresponding to four of the days shown in Fig. 1. These curves show the improvement in condition through hard work. The sum of the pulse rates taken on four different days was as follows: 5/11—532; 5/15—508; 5/19-487; 5/22-480. The lessened number of heart beats required for progressively more work would seem to indicate better conditioning.

TABLE I

FATIGUE CURVES

Date	*No. of Participants*	*Average Production*
5-11	178	28.6
5-12	177	33.5
5-13	198	34.1
5-15	172	36.2
5-16	115	38.9
5-17	197	40.4
5-18	201	42.4
5-19	199	44.6
5-20	198	46.3
5-22	203	48.6

1) and Table I show the typical pattern. The pulse rates also present their particular pattern as indicated in the second chart (Fig. 2). The fatigue inhibitions as shown by irregularities in numbers of steps are constant in poorer and better conditioned athletes. The ceiling of speed gets higher in successive days. There is increased power, or *production*. The pulse rate curves show the *decreased costs* for *greater production*. Greater efficiency is obtained through intelligent guidance.

These 200 soldiers cut three seconds from their previous record for the 300-yard shuttle run in two weeks. Their required five-mile run became much easier in comparison with the discomfort before production of the series of fatigue curves.

It is of interest to compare the increased speed of 70 per cent in the vertical spot running with the 7.5 per cent increased speed of the horizontal or 300-yard shuttle run. In the former activity the time factor remains the same. In the latter activity the distance of the 300-yard shuttle remains constant and improvement is noted by less time.

SUGGESTIONS

It is suggested that a number of physical educators clock forty students for the 300-yard or some other distance in a shuttle or straight-away run. Twenty of these clocked may be the control group who may engage in any physical activity including a daily run of the measured distance.

The other twenty should produce a spot running fatigue curve, going "all out," daily for ten days. Only the aggregate curves need to be plotted. The pulse rates need not be taken in this experiment, though they will present interesting data in retrospect.

A fine picture of the work done may be seen with the curves. The second twenty who have produced the fatigue curves will have

gained speed. They will be seen to have improved relatively more than the twenty who did not produce fatigue curves.

Aside from the time involved in timing the runners there is a minimum of time involved in the experiment. Each participant works 100 seconds daily for ten days or a total of 16-2/3 minutes. The administrator needs to give no more than five hours to master a post-graduate course and to direct one series. In administering this test, it should be remembered that it is *a series of tests, administered regularly,* not just one administration. The tests are as developmental as they are diagnostic. In the beginning, some time must be given to teaching the performers how to find and count their pulses. Many press so hard with the fingers as to obliterate the beat.

In starting the test, it is wise to begin the run when the second hand is at 50 seconds. The finish then comes exactly at 60 seconds. The first pulse count after exercise begins at 10 seconds, and all subsequent ones (2 minutes, 4 minutes and 6 minutes) exactly on the 60-second mark. This procedure minimizes errors. A "check count" for those who may have missed the count should begin 5 seconds after the end of the regular count. If recorded, this should be encircled to identify it.

The Relationship Between Success in Physical Education and Selected Attitudes Expressed by High School Freshmen Girls

By Martha G. Carr

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and Junior College
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PURPOSE OF THE STUDY

THE purpose of this study was to determine the relationship between success in physical education and selected attitudes of high school freshmen girls.

NEED FOR THE STUDY

Over a period of years, the writer had observed that all girls do not adjust to the school program of physical education with the some ease and speed. Neither do they learn at the same rate. It was felt that if an inventory and an evaluation of the attitudes of the freshmen girls could be made early in the year, that some of the student's difficulties in adjusting to the program could be anticipated by the instructor early enough to assist the student in making proper adjustments for better learning. It was assumed that attitudes might be an effective factor in learning.

ANALYSIS OF THE PROBLEM

The main problem of determining the relationship between success in physical education and attitudes was reduced to two smaller problems: namely, the construction of an attitude-rating scale, and the comparison of attitude ratings with final marks of students in physical education classes.

DEVELOPMENT OF THE ATTITUDE-RATING SCALE

To construct the attitude-rating scale, it was necessary to compile a number of statements expressive of certain attitudes. The general literature in organization and administration, philosophy and methods, and state courses of study was reviewed. Three main areas emerged from which ninety-four statements were constructed follow-

A study submitted in partial fulfillment of the requirements for the degree of Doctor of Education in the School of Education, Indiana University, April, 1944.

ing the guides set up by Thurstone and Chave.[1]* Following are the items included in the three main areas.

The items included in the social area pertained to:

competition
leadership
sportsmanship
race prejudice
need for social contacts
need for group approval
regard for opposite sex
regard for authority
religious prejudices

The items included in the personal area pertained to:

self-improvement
regard for teachers
willingness to take instruction
regard for the appropriateness of play clothes
cleanliness as a habit
orderliness as a habit
response to physical surroundings
modesty in bathing
fear of infection
fear of being injured
fear of menstrual disorders

The items included in the activity area pertained to:

playing in groups versus playing alone
indoor play versus outdoor play
running and jumping for girls
strenuous play versus quiet play
self-testing qualities of play
dancing as a desirable activity for girls
swimming as a safe activity for girls

The second step in the construction of the attitude rating scale was to compile a number of statements expressive of attitudes toward the items in the three general areas just listed. Ninety-four statements were constructed following the guides set up by Thurstone and Chave for the selection of statements for an attitude-rating scale.[1] The ninety-four statements were prepared in a form to be sent out to a rating jury.

Selection of the rating jury.—Ninety-six physical educators were selected to serve as a rating jury for the attitude-rating scale. All the individuals selected had had articles published in one or more

* Superior figures refer to bibliography at end of article. A more extensive reference list will be found with the original study.

professional journals, or had published a book on physical education, or were members of a national committee of the American Association for Health, Physical Education, and Recreation. Twenty-one states were represented and all sections of the United States were included.

An attempt was made to include women educators from all school levels. Twenty of the group chosen were located in teachers' colleges; forty-six were from universities and colleges; nineteen were from secondary schools; four were from elementary schools; one was from a Y.W.C.A. Two men well known in physical education were included. Fourteen of the jury were known to be administrators.

Instructions given to the jury.—The rating jury was asked to read each statement and to evaluate it on a linear, five-point scale. A rating of five would indicate that the attitude represented by the statement would be most desirable for the learning of physical education activities. A rating of four would indicate a desirable attitude. Any statement rated as three would be considered as a neutral statement having no relation or effect upon the learning of physical education activities. Ratings of two or one indicated that those statements would be, respectively, undesirable or least desirable. The jurors were asked to keep in mind that the scale was to be used for high school freshmen girls only. They were asked to think of the attitude, represented by each statement, in relation to the learning of physical education activities only. No other values or outcomes of such attitudes, such as ethical or moral criteria were to be considered by the jurors.

Results of returns from jurors.—Sixty per cent of the jurors returned their lists in time to be included in the study. All items were rated by all jurors returning the forms.

From the ratings of the jurors, a mean value was obtained for each statement. All statements having a mean value between 2.50 and 3.49 were discarded as being neutral. Ten statements were discarded leaving a total of 84 remaining. The 84 statements remaining were used as the final attitude-rating scale. This scale contained 16 "most desirable" statements, 21 "desirable" statements, 28 "undesirable" statements and 19 "least desirable" statements.

The original 94 statements were rated on the same linear scale by 315 high school freshmen girls of Maywood, Illinois. Mean score values were obtained for each statement in the same manner as for the jurors' ratings. The girls' ratings were found to fall fairly close to those of the jurors. In only twelve statements were the ratings of the jurors and those of the girls more than one step apart. Eight of these differences in evaluation were concerned with the bathing problem, one with dancing, and one with competition.

SOURCES OF THE DATA

Attitude ratings obtained.—In order to obtain an inventory of group attitudes and also a rating of the individuals' attitudes, the attitude-rating scale was submitted to all freshmen girls of Thornton Township High School, Harvey, Illinois, in September, 1940. The rating scale was administered during the first meeting of each class in freshman physical education. During the second meeting, such procedures as enrollment locker assignments, and instructions concerning costumes and bathing regulations were attended to. This was done in order to give some assurance that the attitude-rating scores could not be affected by any of the usual preliminary procedures.

The attitude-rating scale was prepared in mimeographed form, covering two pages, with the 84 statements listed in random order. This meant that the student was required to make responses in succession to desirable and undesirable attitudes with no definite placement by rank. It was felt that if all the statements valued as most desirable were placed on the scale together, the student might become aware of this grouping and might check the scale as she thought it should be checked rather than as she really felt. There was no evaluation of the statements indicated in any way on the form checked by the girls. The students had no way of knowing that the attitude statements had been evaluated by the jury. The student simply indicated on her paper whether she agreed or disagreed with each statement. Her name was signed to the paper. This was necessary for later comparisons.

After all the attitude scales had been administered, they were held until after the medical examinations were completed. Comparisons in this study were made only for those students who were placed in unrestricted activity by the examining physicians. The total number of cases studied from this group was 335.

Scoring of the attitude-rating scales.—To score the attitude-rating scale, only statements agreed to by the student were considered. An individual score for each student was obtained by subtracting the per cent of undesirable attitudes held from the per cent of desirable attitudes held by the individual. These individual ratings for each girl were to be used as a basis of comparison with achievement in physical education.

Group inventory of attitudes held by students.—A group inventory was made from all the attitude scales to find what per cent of the total group had agreed with each statement. This also gave the per cent of disagreement on each statement. Those who agreed with any statement were said to hold that attitude toward the issue in question. It was hoped that this type of inventory might later serve as a means of validating the rating scale as well as an aid to

the teacher in anticipating the problems of learning within a class group.

Final marks as first criterion of success.—Final marks based upon achievement in activities taught in the freshman course in physical education were obtained from the instructors in those courses. These marks were to be considered as the first criterion of success. Activities included in the course were stunts and tumbling, games of low organization, folk dancing, and swimming. All were marked on an objective basis. Games were not included in the final mark because of the difficulty in marking them objectively. A detailed explanation of the marking system can be found in the original thesis.

Battery of individual athletic events as second criterion of success.—Scores from a battery of individual athletic events were obtained from the instructors of the freshmen classes. All tests in this battery were chosen from the Neilson and Cozens Achievement Scales except the Burpee test.[2] This battery included the following tests:

Potato race	Accuracy throw
50-yard dash	Distance throw
Jump and reach	Burpee test

Intelligence quotients obtained.—The I.Q. scores for all students included in this study were obtained from the supervisor of instruction of the school. These were to be used as one basis for comparison.

TREATMENT OF THE DATA

Final marks in physical education.—After the final marks in physical education were obtained, it was possible to establish two groups for comparative study. The group called the "successful group" included all those students who were given final marks of A or B in physical education. The "unsuccessful group" included all those students who were given a mark of C or D in physical education. The first group numbered 212 while the unsuccessful group numbered 123 cases.

The Intelligence Quotients.—The following data were obtained from the I.Q. scores of the 335 cases.

	Range	*Mean*	*S. D.*	*Critical Ratio*
Total group	70-159	109.8	12.5	
Successful group	80-159	111.4	12.2	3.0
Unsuccessful group	70-139	107.1	12.6	

Battery of individual athletic events.—Two different scores for the battery of tests were obtained for each girl. The first score represented the girl's performance in the tests when given in September. The second score showed her performance in May at the end of the year. The September scores were used only to compare the

progress made between the successful and unsuccessful groups. The scores from the May tests were used as a second criterion of success. These scores were not included in the final mark in physical education. Following are the data obtained from the September and May scores.

September battery scores for both groups:

	Range	*Mean*	*S. D.*	*Critical Ratio*
Successful group	10-69	35.15	10.1	7.0
Unsuccessful group	0-54	27.45	10.1	

May battery scores for both groups:

	Range	*Mean*	*S. D.*	*Critical Ratio*
Successful group	15-69	40.30	9.5	7.5
Unsuccessful group	5-64	31.55	10.6	

Individual attitude-rating scales. — The attitude-rating scales when scored in the manner previously explained yielded the following data:

	Range	*Mean*	*S. D.*	*Critical Ratio*
Total group	-10-99	57.6	15.96	
Successful group	- 1-99	60.30	14.31	5.25
Unsuccessful group	-10-89	53.05	11.26	

Data from attitude statement inventory.—A complete inventory was made from all attitude scales as checked by the 335 students. From this inventory a per cent of agreement on each statement was obtained for the total group as well as for each final mark classification group. These per cents may be found in the complete form of this study.

In order to make a more refined study of the power of each statement in the scale to discriminate between success and failure in physical education, the inventory of each statement was divided into two separate groups. The first group was made up of those students who agreed with a specific statement and the second group was made up of those who disagreed with the statement. These tabulations were recorded by their final marks in physical education. This meant that each group was thus sub-divided into four letter-mark groups. Each statement was treated as a separate problem in this procedure. These tabulations are shown in an example below.

Statement number	*Agreeing with*				*Disagreeing with*			
	A	B	C	D	A	B	C	D
1	55	153	98	24	0	4	1	0
2	55	146	95	23	0	11	4	1

The next step in this procedure involved obtaining a mean final letter mark for those students who agreed to the statement and also a mean of marks for those who disagreed with the statement. It was necessary to assign a weight, or quantitative value, to each kind of letter mark. This was done by assigning a sigma value or weight to each mark. The frequency of each letter mark was multiplied by

its sigma value and a critical ratio for each statement was obtained when the means of the two groups (the agreed and the disagreeds) were compared. This procedure was followed for each of the 84 statements in the attitude scale. These may all be found in the appendix.

A critical ratio for each of the original 28 items used for the attitude-rating scale was obtained by averaging the critical ratios of all statements related to any one item. Items in rank order by their averaged ratios are listed below.

Rank	*Average Critical Ratio*	*Item*
1	2.16	Swimming as a safe activity
2	2.12	Running and jumping for girls
3	2.11	Modesty in bathing
4	2.04	Strenuous versus quiet play
5	2.03	Dancing as a desirable activity
6	2.01	Fear of menstrual disorders
7	1.92	Regard for authority
8	1.87	Competition
9	1.76	Religious prejudice
10	1.66	Willingness to take instruction
11	1.60	Fear of injury in play
12	1.57	Cleanliness as a habit
13	1.38	Regard for appropriateness of play clothes
14	1.34	Need for group approval
15.5	1.31	Sportsmanship
15.5	1.31	Orderliness as a habit
17	1.29	Race prejudices
18	1.26	Bathing in relation to colds
19.5	1.22	Play in groups versus play alone
19.5	1.22	Regard for social contacts
21	1.07	Leadership
22	1.03	Fear of infection
23	.89	Regard for other sex
24	.87	Regard for teachers
25	.85	Self-testing qualities
26	.74	Self-improvement
27	.71	Indoors versus outdoors
28	.70	Response to physical surroundings

M = 1.43

The 24 statements with a critical ratio of 2.0 or more were used for a direct comparison of the A and D students. This is shown by per cent of endorsement.

Statement number	*Desirable Statements*	A%	D%	*Difference*
60	There is more than a small chance of catching a disease in shower rooms.	42	54	—12
31	I like to bathe after playing hard.	95	75	20
74	I do not mind having other girls around while I am taking a shower.	64	33	31

69	Games with running and jumping are healthful for most girls.	96	67	29
17	Dancing is a necessary part of every girl's education.	76	58	18
9	I like to have a place to keep my own things.	95	100	—5
47	I would not mind having other girls around when I take a shower.	58	38	20
27	I like games that have lots of vigorous activity in them.	98	88	10
16	I would be willing to play with girls of a different race or color especially if they had no one else to play with.	95	71	24
	Undesirable Statements			
46	It makes no difference to me whether I win or lose in a game.	64	82	18
34	It would make me very uncomfortable to have anyone around while I take a shower.	36	75	39
65	It is a waste of time to bathe after playing hard.	5	29	24
52	I usually want to be my own boss.	22	21	—1
93	If there is a chance of being hurt in a game, I would rather not play.	18	46	28
78	I feel that I should never take a shower during my menstrual period.	84	100	16
88	It is dangerous for most girls to take a shower during the menstrual period.	73	96	23
90	I would rather take a low grade if it is passing than work hard for a high grade.	0	17	17
72	Girls should play games that are not very strenuous.	35	58	23
62	I feel that it makes no difference what kind of clothes one plays in.	13	33	20
77	It is dangerous to swim with other girls in a pool.	4	13	9
83	Being a leader in a group is not important.	11	38	27
48	I have about as much fun playing alone as I do in a group.	5	13	8
70	I feel that other people have no right to tell me what to do.	0	8	8
73	One kind of a game is as good as another.	43	67	24

ANALYSIS OF THE DATA WITH CONCLUSIONS

The original purpose of this study was to determine the relationship between success in physical education and selected attitudes expressed by high school freshmen girls. In order to determine this relationship, it was necessary, first, to establish criteria of success in physical education, and second, to develop a valid attitude-rating scale.

The method of marking in freshman physical education (fully explained in the original work) was not completely objective, yet it did tend to become so, since the instructors were in such close

agreement as to what constituted a passing performance in all the skill tests.

For a basis of comparison, two experimental groups were set up. One group was composed of the students who received an A or B as a final mark and were considered as a successful group. The other group was composed of those students who received a C or D as a final mark, and were considered as unsuccessful in physical education. Although all four letter marks are passing marks in this particular school, they do not all give the same number of credit points toward graduation. From this standpoint, it was justifiable to use the two categories of successful and unsuccessful for comparison in the other factor of attitudes.

Since the attitude scales were check lists which had to be read and comprehended, it was felt to be advisable to compare the two experimental groups in respect to their I.Q. scores. The critical ratio of 3.0 obtained when difference of means was found would indicate that there was a significant difference in the intelligence quotients of the two groups. This difference, although highly significant, was not thought to be great enough to preclude any further comparisons of the groups. From this difference shown in the two groups, we may safely conclude that the I.Q. of a student is one affective factor influencing her success in physical education.

The battery of individual athletic events was used in this study chiefly to give evidence of the objectivity of the marking system used in obtaining final letter marks. The battery scores were used also as a second criterion of success. When the means of the May battery tests for both groups were compared, they yielded a critical ratio of 7.5. This gives a decided indication that the difference in performance of the two groups was significant. The items in the battery are objectively scored. This objectivity would seem to strengthen the objectivity and reliability of the marks given by the instructors.

The September scores from the battery tests were compared in order to ascertain the original difference in performance of the two groups. The critical ratio for this difference in means was found to be 7.0 which indicates that the difference was certainly significant even at the beginning of the school year. When the results of the September testing were compared with those of the May testing, it was shown that both groups improved in performance of the battery but that the greater improvement was made by the successful group. Since both groups did show improvement, we can feel certain that the initial difference in their performance scores was not the only factor to account for the difference in final success.

The data obtained directly from the attitude-rating scales resulted from two different procedures. First, the individual scale

scores of all students were considered in relation to success in physical education; and second, the statements themselves were investigated. In the first consideration of individual scores on the attitude scales, we find a wide range for the total group. Some students held such a high per cent of undesirable attitudes that a negative score resulted. Others were found to hold only one or two undesirable attitudes as contrasted with almost complete endorsement of the desirable attitudes. The critical ratio of 5.25 for the difference in means in attitude ratings of the two groups was decidedly significant.

The significant difference in attitudes of the successful and unsuccessful groups, as shown by the critical ratio of 5.25 can serve as at least a partial explanation of the contrast in performance of both groups in the first battery tests given in September. If attitudes were effective in determining a student's final success in physical education, we can be fairly certain that they were a strong influence in the degree of success shown by each student in the early testing before any possible re-education had taken place.

Three factors were involved in the comparisons made between the successful and unsuccessful groups, namely, the I.Q. (critical ratio of 3.0) the attitudes (critical ratio of 5.25) and the performance in the individual athletic events of the battery, (critical ratio of 7.5). We may conclude from the data obtained, that the affect of these three factors upon the final marks would place them in the following order of relative influence: (1) motor ability, (2) attitudes held, and (3) the I.Q.

In the light of the data obtained from the statement-by-statement inventory, a number of significant facts were brought out. Forty-three of the eighty-five statements yielded a critical ratio of 1.40 or more. Considering that a critical ratio of 1.40 indicates that there are 93 chances out of a hundred that the difference is significant, we can be fairly certain that at least half of the original 84 statements in the attitude scale could be safely used to prognosticate success or failure in physical education. This assumes that the terms "success" and "failure" are interpreted as they were in this study.

In reviewing the list of items included in the attitude scale listed with their critical ratio values, we find that the attitude toward the safety of swimming ranks first in significance. It has long been felt that fear of the water was a powerful factor in failure to learn to swim. The fact that it is shown here to rank first only emphasizes this fact.

It is interesting to note that the item ranking second related to running and jumping for girls, Since such a large part of the modern physical education curriculum for girls entails much running and some jumping, it is not surprising to find that the attitude re-

lated to those activities would be influential in determining success or failure of students.

From the list of items ranked by their critical ratios, the problem of bathing, as a part of the physical education program, can be broken down into several of its various phases. Modesty in bathing is ranked third in significance while cleanliness as a habit ranks only 12th and bathing in relation to colds ranks 18th. Evidently it is important to help new students to make easy and satisfactory adjustments to the dressing and showering program if they are to attain optimum value from their physical education.

Fear of menstrual disorders which might result from bathing ranged 6th in significance. This fear was held by 80 per cent of the students in this study. Instruction in health courses could help to eliminate this fear.

Another interesting contrast may be seen in the two items, "regard for authority" which is ranked 7th and the "regard for teachers" which is ranked 24th. We might infer that teachers in general represent authority and as such are a significant factor, but that personal feelings of students toward teachers is not such a strong factor in the students' learning.

The element of competition plays a strong part in the high school physical education curriculum. Since it is ranked 8th in the list of 28 items, it would seem to be important as an effective influence in physical education.

Looking at the low end of the list of ranked items, it can be noted that there are six items usually thought to be quite important, which were shown in this study to have very little significance in determining success. The last two items deal with the surroundings. Evidently learning is not affected too much by an indoor or outdoor program as 92 per cent of the entire group agreed that they preferred playing outdoors and yet the greater part of the freshman program was by necessity carried on indoors.

The modern program of physical education has stressed for a number of years the stunts program because of its self-testing qualities. This study indicated rather strongly that these high school girls were not especially interested in self-testing. That item ranked 25th in significance.

When the mean critical ratios of the three different areas were compared, they were found to be very close in mean significance. The activity area gave a mean ratio of 1.59, the social area a mean of 1.51, and the personal area a mean ratio of 1.35. Although the differences are not great, it is to be expected that the activity area would show greater significance than the other two since physical education curricula are primarily concerned with physical activities.

In comparing the attitudes of the A and D students, who repre-

sented the highest and lowest success, it was found that the A students, as a group, endorsed a higher per cent of the desirable attitudes and a lower per cent of the undesirable attitudes than did the D students. As a group, the A students had a stronger competitive spirit than the D students. They were also less fearful of being hurt and were convinced that running and jumping are healthful activities for girls.

The A students showed much less aversion to matters concerned with bathing. They liked to bathe, especially after playing hard, and were not so concerned about privacy for their bathing. This apparent immodesty would seem to be not a desirable attitude, but it was rated as desirable by the jury which was asked to rate the attitude only in its relation to the physical education program. Showering is now an established part of the routine of most school programs and gang showers are becoming more and more accepted for girls. Therefore, students who hold fewer negative attitudes in regard to bathing problems will certainly have less adjustment difficulties in the modern physical education program.

Both the A and D students were fearful of bathing during the menstrual period. Although the A students felt that it should not be done, they did not feel that there was actual danger in the practice. The D students were more positive about the danger involved.

As might be expected, the A students showed a greater desire to obtain high marks, whereas the D students were willing to take low marks if they were passing.

D students were not interested in being leaders and some felt that other people had no right to tell them what to do. Evidence was shown that D students in this study held negative attitudes toward leaders and leadership. The D students were less willing to play with girls of another race or color and were about as happy playing alone as with a group.

Conclusions.—From the analysis of data collected from 335 high school freshmen girls who were asked to check an attitude-rating scale related to physical education, we can conclude that the attitudes held by entering freshmen girls do influence their success in physical education. It was shown that there was a significant difference in the attitudes related to physical education of the successful group as compared with those of the unsuccessful group.

Three factors were found to be effective in determining success in physical education, namely, motor ability, attitudes, and intelligence.

For the sake of better guidance of students in physical education classes, it would seem advisable for teachers to make themselves aware of the attitudes of their students. If undesirable attitudes are obstacles to learning, it would follow that the removal of those ob-

stacles should facilitate learning. Students who will be handicapped by poor attitudes should be helped just as the students who are physically handicapped are helped.

For further study, it is suggested that an attempt might be made to determine if and how attitudes might be changed. This study would entail the development of various methods for changing attitudes and a comparison of their relative values. The study of the genesis of attitudes would be a necessary forerunner of such a study.

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APPENDIX

STATEMENTS INCLUDED IN THE ATTITUDE RATING SCALE LISTED IN ORDER OF DECREASING DESIRABILITY

Mean Score Value by Jury	*Critical Ratio*	*Attitude statements*
4.91	.38	Being a leader is a fine responsibility.
4.88	.87	I feel as if I am learning something when I play with someone who plays better than I do.
4.81	.28	I prefer playing outdoors when the weather is good.
*4.73	2.57	I like to bathe after playing hard.
4.71	.50	I like to set a goal for my own improvement and want to practice until I reach that goal.
4.68	.14	I like to talk to my teachers as that makes them seem like friends.
4.66	.53	I prefer to play in a playsuit as I feel I can play more freely.
*4.65	2.10	I like games that have lots of vigorous activity in them.
*4.65	2.16	I like to have a place to keep my own things.
4.64	.13	Playing games with a group is more fun than playing alone.
4.63	1.17	I like to try new things just to see if I can do them.
4.62	1.28	Teachers are friendly and helpful if I try to do my work.
*4.62	2.30	Dancing is a necessary part of every girl's education.
4.60	1.00	I like to be a leader in a group if I feel that the whole group wants me.
4.51	.40	I like to be given suggestions as to how to improve myself.
4.50	.40	I like to be able to do things as well as my friends do.
4.45	.23	Teachers usually have very good advice to offer.
*4.43	1.50	Taking a shower after playing hard is a necessary precaution against taking cold.

* Statements marked thus were found to be highly significant. They could be used for a short form of the attitude-rating scale.

4.35	.01	I am uncomfortable if I have to wear clothes that have been worn by someone else.
*4.31	4.27	There is more than a small chance of catching a disease in the shower room.
4.25	1.00	There is no reason why I should not take a shower when I am menstruating.
4.24	1.00	There is a chance that I might catch some skin infection if I wear other girls' clothes.
*4.15	2.10	I would not mind having other girls around while I take a shower.
*4.13	2.54	I do not mind having other girls around while I take a shower.
4.10	.50	I like to play games in which one team tries to outdo the other team in playing ability.
4.10	.16	I never wear clothes that belong to other girls.
4.08	1.00	I do not mind having my mother or sister around while I bathe.
*4.05	2.43	Games with running and jumping are healthful for most girls.
3.91	.41	It is probably a good thing to bathe after playing hard.
*3.86	2.00	I would be willing to play with girls of another race or color, especially if they had no one else to play with.
*3.83	1.90	To take a shower with others around is no worse than to take a shower alone.
3.77	.83	I feel sure that taking a shower after playing hard will prevent me from taking a cold.
3.76	.83	My friends will like me better if I take a shower after playing hard.
3.76	.46	Disease caught in the shower room might be caught any place else.
3.75	1.10	The chance of catching a disease in a shower room is very small.
3.75	.69	I feel much better in a room with light walls than in one with dark walls.
3.55	.13	I can keep my clothes neat and orderly if I have to.
*2.45	1.83	It makes me feel very bad if I am the last one to be chosen in a game.
*2.31	2.10	I have about as much fun playing alone as I do in a group.
*2.30	2.58	I usually want to be my own boss.
*2.29	1.66	Games played with boys are more fun than games played with girls.
2.25	1.10	I am uncomfortable if I have to wear clothes that are not like those other girls are wearing.
*2.18	5.16	It makes no difference to me whether I win or lose in a game.
*2.08	2.00	One kind of a game is as good as another.
2.01	.09	I usually am satisfied with the way I do things.
*1.95	3.00	It would make me very uncomfortable to have anyone around while I take a shower.
*1.94	1.75	I do not like to play games in which I try to win over an opponent.

1.86	.11	Playing games with boys is not fun as they are too rough.
1.85	.45	One teacher is as good as another.
*1.85	1.80	I like quiet games with no running or jumping.
*1.83	2.27	Girls should play games that are not very strenuous.
*1.81	2.53	If there is a chance of being hurt in a game I would rather not play.
*1.81	1.65	Keeping things in order all the time takes too much time from other things.
*1.81	1.63	I like to play with only one or two girls.
1.80	.57	Keeping score in a game bothers me.
*1.78	2.15	Being a leader in a group is not important.
1.76	1.14	I like to play indoors better than outdoors.
1.73	.35	I do not mind if my clothes are worn by someone else.
1.66	.58	It makes very little difference in the prevention of colds whether or not I take a shower.
*1.61	2.26	I feel that it makes no difference what kind of clothes one plays in.
*1.60	1.50	Taking a shower after playing hard is an unnecessary precaution against taking cold.
*1.56	1.60	I dislike wearing playsuits.
1.56	.66	I like to play with just the girls in my neighborhood.
*1.55	1.40	I do not enjoy playing with girls who can play better than I can.
1.50	.58	I feel that I should play with only girls of my own race or color.
*1.43	1.90	Taking a shower after playing hard may give me a cold.
*1.43	2.40	I would rather take a low grade if it is passing than to work hard for a high one.
*1.40	2.50	It is dangerous for most girls to take a shower during the menstrual period.
*1.36	2.00	I feel that other people have no right to tell me what to do.
1.33	.42	It makes no difference to me whether I bathe after playing hard.
*1.31	1.70	I usually will do what my friends do although it is against my better judgment.
*1.30	1.60	I like best to play alone.
*1.26	1.55	I do not like to bathe after playing hard.
1.25	.73	The leader of a group does all the work and has no fun.
*1.23	2.90	It is a waste of time to bathe after playing hard.
*1.23	1.61	Teachers are like dictators because they want to boss us.
1.20	.86	Taking showers with other girls is a sure way of catching a disease.
*1.16	2.16	It is dangerous to swim with other girls in a pool.
*1.16	1.76	I feel that I would be lowering myself if I took part in a dance.
*1.16	1.50	Teachers make rules just to make us behave the way they want us to.
*1.10	1.40	It is a waste of time to change clothes in which to play.

1.10	.06	We are born to be as we are. There is no use to try to improve.
1.08	.79	Being beaten in a game is disgraceful.

Analysis of Physical Fitness Index Test Scores of Air Crew Students at the Close of a Physical Conditioning Program

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SUBJECTS

THIS statistical analysis of Physical Fitness Index (PFI) data is based upon the test scores obtained from a random sampling of 914 students in the Army Air Forces College Training Program at Syracuse University, Syracuse, New York. These men may be classified as a "good" condition group. They were carefully selected physically as prospective flying personnel; and they had participated one hour per day, six days per week, in a three-to-five month physical training program.[1] The PFI tests were administered at the start and close of each student's training period.

The Syracuse physical training program consisted of ten selected activities balanced equally for their strengthening and endurance contributions to total fitness. The five strengthening activities consisted of wrestling, tumbling, conditioning drills, exercises on the apparatus, and games and contests; the five endurance activities were cross-country running, obstacle course, running games and sports (basketball, soccer, etc.), boxing, and swimming. Other important benefits, obviously, were derived from participation in these activities.

Army directives clearly stated that the physical training program for aircrew students should concentrate on physically conditioning these men in the shortest possible time. Emphasis, therefore, was placed on maximum activity participation. Teaching of skills was on an elementary level, sufficent only for vigorous participation in the activities. All students participated in the same activities; no attempt was made to study and meet the specific needs of students with initial low PFI scores.

The data upon which this article is based were obtained at Syracuse University before the author entered active military service. Acknowledgement is made to the Syracuse University physical education and coaching staff for administering the PFI test, and to Sergeant William T. Raney, A.C., for making the statistical computation of the test data.

1 The length of time aircrew students were in the program varied from three to five months depending upon Army orders as they affected individual students.

THE PFI TEST

The PFI battery[2] is composed of six strength tests: right grip pounds), left grip (pounds), back lift (pounds), leg lift (pounds), push-ups from parallel bars supporting full weight (number of times), and pull-ups (number of times), plus lung capacity (cubic inches). With the exception of push-ups and pull-ups, these tests are recorded on calibrated, mechanical instruments. The PFI is the individual's gross score achieved on the tests (Strength Index) related to a norm based upon his weight and age. A score of 100 is considered average. Those with deviations from this figure are classified as physically superior or inferior as the case may be.

The PFI test has been carefully constructed and there is considerable evidence to justify its use as a basic test of physical condition. Although the test does not provide for the measurement of cardiorespiratory endurance, it does test the underlying muscular strength factors essential to the development of such endurance. The individual with a high PFI, therefore, may or may not have developed cardiorespiratory endurance, but he does have the basic physical strength to acquire it with appropriate training.

THE ANALYSIS

Table I is a decile table, with the 25th and 75th percentiles included, for Strength Index, Physical Fitness Index, body weight, and the various tests of the PFI battery. Table II gives the variability of the scores in terms of range, interquartile range, and standard deviation. From a study of these data, two factors stand out as particularly significant: the high test scores achieved by the 914 aircrew students; and the relative homogeneity of the group as a whole.

TABLE I

DECILE TABLE OF PHYSICAL FITNESS INDEX TEST ITEMS*

	Strength Index	*PFI*	*Lung Capacity*	*Right Grip*	*Left Grip*	*Back Lift*	*Leg Lift*	*Push-Ups*	*Pull-Ups*	*Body Weight*
100	4819	169	400	203	190	800	2500	26	21	209
90	3697	130	346	158	148	642	1880	18	13	181
80	3462	123	330	150	139	601	1760	16	12	173
75	3395	120	323	147	136	585	1703	15	11	170
70	3321	118	317	144	133	570	1650	15	11	168
60	3189	114	307	139	128	542	1558	13	10	164
50	3073	109	296	134	124	520	1482	12	9	160
40	2951	106	286	129	120	498	1411	11	8	155
30	2841	102	275	125	116	476	1339	10	7	150
25	2783	100	270	122	113	465	1302	10	6	148

*Data obtained from sampling of 914 students in the Army Air Forces College Training Program, Syracuse University, Syracuse, N. Y., after three to five months' physical conditioning.

[2] For a complete discussion of the techniques of administering PFI tests (illustrated) and the follow-up procedures for using test results in meeting individual physical fitness needs of students with low PFI's, refer to *The Application of Measurement to Health and Physical Education*, by H. Harrison Clarke, New York: Prentice Hall, Inc., 1945.

20	2714	98	265	120	111	454	1265	9	6	146
10	2545	92	250	113	103	420	1183	7	5	140
0	1907	75	160	90	65	330	700	0	0	111

High Scores (Table I)

1. The median PFI score of the aircrew students was 109.2; the mean score, 110.6.[3] These scores are well above the average of 100 for school and college students. Other median scores are comparably high: Strength Index, 3073; lung capacity, 296; right grip, 134; left grip, 124; back lift, 520; leg lift, 1482; push-ups, 12; pull-ups, 9; and body weight, 160.

2. Twenty-five per cent of the aircrew students had PFI's below 100. In normal civilian populations 50 per cent are below this score, while 25 per cent have PFI's below 85. With the aircrew men, only six per cent were below this latter score.

3. PFI's of 92 were achieved by 90 per cent of the aircrew students. None of these students had scores below 75, and only 10 were below 80. The other scores for the lowest 10 per cent were below the following: Strength Index, 2545; lung capacity, 250; right grip, 113; left grip, 103; back lift, 420; leg lift, 1183; push-ups, 7; pull-ups, 5; and body weight, 140.

4. The 75th percentile for the aircrew students was 120. With unselected populations, this score is 115. Other 75th percentile scores are as follows: Strength Index, 3395; lung capacity, 323; right grip, 147; left grip, 136; back lift, 585; leg lift, 1703; push-ups, 15; pull-ups, 11; and body weight, 170.

5. Ten per cent of the aircrew students had PFI's above 130; the highest achieved was 169.

Homogeneity (Table II)

1. The interquartile range for the aircrew students was 20, which is two-thirds of the comparable range of 30 for unselected school and college students. The middle sixty-eight per cent (standard deviation) of the aircrew men was within 30 PFI points.

2. The weights of the middle 50 per cent of the aircrew students were contained within a range of 22 pounds (148 to 170). The standard deviation was 13 (the middle 68 per cent being within a range of 26 pounds). Only 10 per cent of the men had weights below 140 or above 181 pounds.

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[3] The average PFI of these men at the start of their training period was 100. This relatively low score for a select group of men was probably due to a prolonged period of physical inactivity prior to initiation of their conditioning program.

TABLE II

VARIABILITY OF PHYSICAL FITNESS INDEX TEST ITEMS*

	High-Low	*Range*	*Inter-quartile Range*	*Standard Deviation*
Strength Index	4819-1907	2912	612	449
Physical Fitness Index	169-75	94	20	15
Lung Capacity	400-160	240	53	37
Right Grip	205-90	115	25	18
Left Grip	190-65	125	23	16
Back Lift	800-330	470	110	86
Leg Lift	2500-700	1800	401	276
Push-Ups	26-0	26	5	4
Pull-Ups	21-0	21	5	3
Weight	209-111	98	22	13

* Data obtained from sampling of 914 students in the Army Air Forces College Training Program, Syracuse University, Syracuse, N. Y., after three to five months' physical conditioning.

3. Variability by Strength Index also indicates considerable homogeneity. The interquartile range was 612, the standard deviation, 449.

4. The variabilities of the various test items are also comparable in homogeneity.

CONCLUSIONS

The following conclusions may be drawn from this analysis of Physical Fitness Index test scores achieved by 914 aircrew students at the close of a three-to-five month physical training program at Syracuse University:

1. The test scores achieved by the aircrew students were well above the average for school and college men at large. The scores achieved on the various tests were also very compactly grouped around their respective measures of central tendency.

2. Twenty-five per cent of these men, however, did not reach the level of the average college student. These students in particular needed further physical training and would have benefited from individual follow-up work. Follow-up procedures which have proven effective in improving the physical fitness of low PFI students are based upon a study of the cause of physical weakness in each individual and the institution of appropriate remedial and developmental procedures in each case.

A Historical Study of the Concern of the Federal Government for the Physical Fitness of Non-Age Youth With Reference to the Schools, 1790 - 1941

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I. INTRODUCTION

As the war threatened in 1939 the fitness of the youth of the United States became a subject of great importance. It had been known for some time that Germany had established a national program of vigorous physical training for all Aryan boys and girls. There was a note of warning for the world in the results of the rigid physical tests required of all German youth upon entering secondary school, and the order that every child be a member of a Hitler Youth group. Italy had adopted certain national methods in physical training, and, as was revealed later, Japan had pursued a similar course.

Sports and activities of a recreational nature had been popular in the United States for some years; however, participation was far from universal. Three-fourths of the states had passed either mandatory or provisional laws in physical education but the programs suffered generally from lack of facilities, personnel, and the legal provision for enforcing the laws.

With the outbreak of war in December, 1941, the vigor and stamina of the youth of the United States became a focal interest. Though the war was to be highly mechanized, the strength, endurance, and physical courage of men remained essential. The bodily condition which in peacetime had been taken for granted became overnight the first major requirement for a nation at war.

The findings of the actual health status of men examined for the Army revealed that 45 per cent of the registrants were found to have physical or mental defects. Immediately the government set up rigorous physical training programs for all of its military personnel. By presidential order the Division of Physical Fitness as a Federal agency was established in the Office of Civilian Defense for the purpose of developing a civilian program. The Division publicized the

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draft findings through public rallies and literature, at the same time enlisting the support of schools, industrial organizations, clubs, and recreational groups to promote programs of physical fitness.

Recommendations for high schools made through the Division of Physical Fitness called for a physical training program of one hour each day, five days each week, with added hours of intramural and interscholastic competition in sports. No funds were available for the work but it was hoped that local communities through their boards of education would make the program possible. The government, through the Office of Education, sponsored physical fitness clinics in each of the Army corps areas to promote the program, inviting certain educational leaders to attend for the purpose of carrying the knowledge of the program and the desired results to their respective communities. The federal government, thus, because of the urgency of the problem pressed the schools to aid in the promotion of physical fitness for all youth.

It has been obvious through the years that the lack of funds has been one of the ills of programs of physical education in the schools. It is obvious, also, that in the Second World War the government is taking a more active role in its relationship to school physical education than it has apparently heretofore assumed. It seems logical to believe that the federal interest will not diminish immediately. Using this information as a basis it appeared that a study of the concern of the federal government for the physical fitness of youth from the historical standpoint would be timely and important.

Purpose of the Study

It was the object of this study to investigate, from the historical point of view, the concern of the federal government for the physical fitness of youth under 21 years of age. Since the proceedings of Congress are transacted through bills introduced into Congress, the study was necessarily concerned with formal proposals made to the Senate and the House of Representatives. The study proposed to examine the bills and resolutions made and to analyze these proposals as to time, nature, and outcome.

Sources of Data

Both primary and secondary materials were used in the preparation of the study. Extensive reading was done in *Annals of Congress, Register of Debates, The Congressional Globe, Congressional Record, Journal of the House of Representatives,* and *Journal of the Senate* from the First Congress in 1790, through the Seventy-seventh Congress of 1941. Data were obtained also from photographic copies of the original bills, from committee hearings, from personal conferences,

and from correspondence.

Secondary materials were obtained from reports, journals, and yearbooks of professional educational societies, periodicals, bulletins, pamphlets, and monographs.

II. FINDINGS

Congressional Proposals to Use the Schools to Provide for the Physical Fitness of Youth, *1790-1859*

During the Second Session of the First Congress of the United States under the Constitution, General Knox, Secretary for the Department of War, initiated a plan directed toward the improvement of the physical condition of youth of 18, 19, and 20 years of age. The basis for the need of such training was, according to Secretary Knox, the lack of physical stamina in the Revolutionary War. While the Knox Plan did not involve the schools it was used as the basis for the later William Henry Harrison plan which proposed the use of the schools for the pre-military training of youth.

Literature in 1790 mentioned the "softness" of young men, and the term "fitness" was used in official governmental records. In the report to Congress by the Board of Visitors to West Point during the 1820's, the term "physical fitness" was used, and the need of muscular activity during 12 months of the year, in contrast to summer exercise only, for improving and maintaining the fitness of young men was emphasized.

Military bills H. R. 60 introduced January 17, 1817, and H. R. 35, introduced January 9, 1818, contained the words "able-bodied." The reports accompanying these bills explained how prospective members of the militia might become able-bodied. Emphasis was placed on sports and gymnastic training rather than formal military drill. The 1818 report suggested that the schools be used as a training area and when it was advanced that to use such procedure would be encroaching upon the rights of the state according to the Constitution, a resolution for amending the Constitution was made. No action was taken on the resolution nor upon the suggestions to use the schools for physical conditioning.

Congressional Proposals to Provide for Pre-Military Training in the Schools, *1860-1897*

The first of a series of bills designed to enlist the support of the federal government in providing for military training in the schools was introduced into Congress in 1894. This bill, as well as others proposed in this period, sought to extend the services of the Army and Navy in order that military personnel might be detailed to schools for teaching purposes. The bills were outgrowths of an act passed in

1866 which made it possible for military personnel to be so detailed to colleges and universities to aid in the instructional program in military tactics as required under the Morrill Act of 1862. One bill, S. 2674, resulting in passage in 1895, permitted retired officers of the Navy and Marine Corps to apply for duty as teachers in schools and colleges.

Statistics on the number of rejections by the Army were used by the sponsor of a Senate bill in 1896, as evidence of the need for new methods in the physical conditioning of youth. The formal introduction of the bill providing for a bureau of military education in the War Department included remarks on the content of a desirable physical conditioning program.

In the period from 1894-1897 nine bills and one House resolution were introduced to enlist the support of the federal government in the physical conditioning of non-age youth. Seven of the bills sought to amend Section 1225 of the Revised Statutes so as to include schools in the provisions, two bills attempted to establish a bureau of military education in the War Department, a House resolution attempted to furnish equipment from the government ordnance supplies to schools, and one bill permitting retired Navy and Marine Corps officers to teach in schools and colleges became an act.

Congressional Proposals to Provide for Pre-Military and Physical Training in the Schools, *1898-1917*

Eighteen bills and resolutions, directed toward the improvement of the fitness of youth, were revealed in the official records for the period from 1898-1917. President Theodore Roosevelt lent his support to the movement through sending direct statements to Congress favoring the promotion of the teaching of military training in civil institutions of the Unted States. Secretary of War, Elihu Root, favored such a policy in 1902, as did Secretary of War, Luke E. Wright, in 1908.

Using the schools for the purpose of pre-military training was looked upon favorably by Congress also. This is attested by the fact that four bills directed to this end were passed in this period: House of Representatives bill 4742, proposed originally in 1899, passed with amendments in 1901; Senate bill 5918, introduced in 1902, was virtually the same as the previous House bill; Senate bill 1399, in substance the same as the previous bills but holding an added provision for equipment, passed in 1904; and a bill passed in 1909 provided ammunition to be used in instruction in target practice. In addition, the National Defense Act of 1916 contained provisions for pre-military training in schools.

The Wyoming plan of military and physical training formed the basis of a Senate bill in 1916. The author of the plan, a lieutenant in the United States Army, had devised a method of instruction for

school use which aimed to increase physical efficiency.

The initial proposal to provide for the physical fitness of youth through a program of physical training was contained in a Senate bill in 1902. The bill proposed an executive department of physical culture. In 1910 bills introduced in both the Senate and the House sought to improve the physical efficiency of youth by originating a division for the purpose in the United States Bureau of Education. A 1917 fourteen-page bill sought to promote physical culture through a plan of co-operation with the States. Funds for the payment of teachers' salaries were requested and a plan for the training of teachers of physical culture on a state matching dollar-for-dollar basis was advocated. The bill carried provisions for awards and prizes. No consideration was given to any bill in this period specifically set up to aid in the physical fitness of youth through a program of physical training.

Fifteen of the 18 bills introduced into Congress between 1897 and 1917, were aimed toward the improvement of the physical fitness of youth through a program of military training. The bills which failed of passage, with one exception, contained the approximate provisions of those that passed. They were lost in committee or tabled; none was actually voted down. The remainder were designed, specifically, to aid physical fitness through the field of physical training.

Congressional Proposals to Provide for Physical Education In the Schools, *1918-1941*

Efforts to bring federal support to the physical education programs of the schools in the United States were promoted by the revelations of the World War I draft statistics which evidenced the need. In order to provide for satisfactory programs of physical fitness for youth, the United States Commissioner of Education organized a working committee for the purpose of sponsoring a federal bill directed to this end. The Playground and Recreation Association of America, through its National Physical Education Service, a division originated for the purpose, acted as the central agent for the work. Using the names of the sponsors, the Fess-Capper Physical Education Bill, H. R. 12652, and the companion bill, S. 3950, were introduced in February, 1920. These bills were afforded committee hearings and were the only bills entered on behalf of physical education to be considered thus. However, they were lost in committee with the close of the respective Congress. The bills were revised and re-introduced as the Revised Fess-Capper Physical Education Bills, H. R. 22, and S. 416, but were afforded the same fate as the preceding entries.

During the time the Fess-Capper bills were in committee a series of bills designed to create a Department of Education, and carrying

in their provisions a section on behalf of physical education to the amount of $20,000,000, were under consideration. A number of revisions were made to these proposals but the section providing for physical education remained unchanged throughout. These bills were re-introduced several times but passage was never realized.

Military training in the public high school found sponsors following World War I. A House bill and a Senate bill were entered in the official records designed to encourage such training. Neither was passed. However, a revision of the National Defense Act of 1916 which was passed in 1920, included in its provisions a section which made lawful the detail of Army officers to schools. Ten years later attempts were made to withdraw War Department aid in cases where there was compulsory military training. Although there was discussion of this phase of the program, no bill directed toward this end succeeded in passage.

In 1940 the Schwert Physical Education Bill, backed by the American Association for Health, Physical Education, and Recreation, made its appearance. Federal funds were requested, on a cumulative basis, to the amount of $200,250,000 for the purpose of national preparedness through physical education. Considerable promotional work was expended on behalf of the bill but it never emerged from committee. The same fate was afforded the Revised Schwert Physical Education Bill of 1941.

Minor bills during this period included H. R. 7661, introduced January 3, 1940, H.R. 1798 and H.R. 5801, duplicates of the previous bill; S. 4179 introduced July 3, 1940, and an identical bill, S. 797, introduced in the First Session of the Seventy-seventh Congress. These bills held provisions for a complete survey of physical education resources, and for the establishment of a National Physical Fitness Institute in the Federal Security Agency, respectively.

Miscellaneous proposals, the series of Fess-Capper Physical Education Bills, those to create a Department of Education, and the Schwert Bills reveal that 26 bills with physical training or military training provisions were introduced in the period from 1918 to 1941. Of these, six were directed toward military training, five were entered on behalf of general education but included physical education provisions, and fifteen were designed specifically to aid physical education. One bill, H. R. 12775, secured passage in 1920 as a revision of the 1916 National Defense Act.

III. SUMMARY AND IMPLICATIONS

Summary

In accordance with the initial purpose of this study which sought to investigate, from the historical point of view, the concern of the

federal government for the physical fitness of youth, the following data are offered:

1. In 1790, during the First Congress under the Constitution, Secretary for the Department of War, Henry Knox, presented a report to Congress which proposed a plan designed to improve the physical fitness of 18-, 19-, and 20-year-old youth. The Knox Plan served as a basis for later plans which proposed the use of the schools as a physical training area.

2. A plan to use the schools for the promotion of the physical fitness of youth was disclosed in 1817. A report by William Henry Harrison which accompanied the introduction of a bill to increase the efficiency of the militia proposed that a physical training program in the schools form part of the education of all youth. This plan was based on that of Henry Knox but was more comprehensive and was designed to reach all youth at an earlier age than was proposed by Secretary Knox.

3. A resolution introduced in 1818 sought to amend the Constitution in order to legalize bills which aimed to provide for teaching in the primary and secondary schools the system of military training prescribed for the militia. The resolution accompanied a report which reiterated the 1817 plan to incorporate physical training in the educational program of all youth.

4. Congressional reports from the Board of Visitors to West Point submitted in 1826, 1827, and 1828, embodied the recommendations that a building be constructed for physical training, and that a program of exercises be instituted under a teacher of gymnastics provided for that purpose.

5. Documents of the period from 1828 to 1862 revealed no specific considerations by Congress for either the military training or physical training of youth.

6. The Act of 1866 which provided personnel for the college and university military training program as specified in the Morrill Act of 1862 served as the basic act for amendments which sought to detail officers of the Army and Navy as personnel in the secondary school military training program.

7. Fifty-eight bills and resolutions designed to promote programs of military training and physical training in the schools were presented to Congress between 1894 and 1941.

a. Thirty bills emphasized training primarily military in character.

(1) The first bill designed to provide for physical fitness through a military training prgram in the schools was introduced in the House of Representatives on December 19, 1894.

(2) With the exception of one, all bills entered in Congress to provide for military training were referred to the respective Committee on Military Affairs.

(3) One military training bill, in 1907, was referred to the Committee on Education. Three days later it was re-introduced and referred to the Committee on Military Affairs.

(4) Six military training bills were passed: 1895, 1901, 1904, 1909, 1916, 1920. These provided for the detail of officers of the Army and Navy as instructors to schools, also for equipment to schools where officers were detailed.

(5) No bill designed to promote military training in the schools has been introduced since 1920 when a revision was made in the National Defense Act of 1916.

(6) Bills designed to prohibit the detail of officers of the Army and Navy to schools where military training was compulsory were introduced in 1930.

(7) No bill designed to promote military training in the schools specified that funds were in the extra-pay provisions for officers eligible for such compensation in the performance of special duty, and the bonds to be posted for equipment borrowed from the government.

(8) Four acts relative to military training in the schools were still in effect and were contained in the *United States Code, 1940 Edition.*

b. Twenty-eight bills and resolutions sought to increase the physical fitness of youth through programs of physical education.

(1) The first bill entered on behalf of a program of physical education was introduced in the Senate on February 20, 1902. It provided for an executive department of physical culture with a secretary in the President's cabinet.

(2) Miscellaneous bills sought to:

(*a*) Establish in the Bureau of Education a division for the collection and dissemination of scientific data in physical education.

(*b*) Provide for a complete survey of physical education resources in the United States.

(*c*) Provide for the establishment of a National Physical Fitness Institute.

(3) The Fess-Capper Physical Education Bill of 1920 was accorded hearings in both the Senate Committee on Education and Labor and the House Committee on Education. This was the only physical education bill which received a hearing.

(4) With the exception of one, all physical education bills have been referred either to the Senate Committe on Education and Labor or the House Committee on Education. One bill in 1910, designed to provide for the collection and dissemination of information on physical education, was referred to the Committee on Interstate and Foreign Commerce.

(5) All bills designed to promote physical education in the schools requested federal funds to carry out the provisions of the act.

These funds varied from a request for $4,000 annually for a specialist in physical education in the Bureau of Education, to a request for $200,250,000 annually to be appropriated to the states for physical education, recreation, and school camps.

8. Bills introduced into Congress designed to provide for the physical fitness of youth through either military training or physical training reveal the following:

a. Between 1894 and 1897, the period just previous to the Spanish-American War, ten bills designed to promote military training in the schools were introduced into Congress. None was introduced on behalf of physical education.

b. Between 1898 and 1917, the period after the Spanish-American War and previous to World War I, fourteen bills designed to promote military training in the schools were introduced into Congress. Four were introduced on behalf of physical education.

c. Between 1918 and 1941, the period following the First World War and antecedent to World War II, six bills designed to promote military training in the schools were introduced into Congress. Twenty-four were introduced on behalf of physical education.

Implications

Through the data obtained in the consideration of this study the following implications seem apparent:

1. That the point of view which holds that physical fitness for military service may be acquired more efficiently through a program of physical education than through a program of military training is not new to the discussions in the Congress of the United States.

2. That in the bills introduced into Congress which sought to promote physical fitness through military training, three objectives appeared to be operative:

a. Physical readiness of youth at an early age for efficient service in the army.

b. Pre-military fitness which would permit shorter training periods in the regular service of the army.

c. Occupation for officers of the Army and Navy in times of peace.

3. That Congress considered the subject of military training in the schools to be of military significance rather than an educational consideration. With the exception of one bill, in 1907, which rested with the Committee on Education for three days, all proposals for military training in the schools were referred to the respective Committee on Military Affairs.

4. That additional financial expenditures for programs to promote the physical fitness of youth may have been a determining factor in Congressional considerations, since Congress acted on military training

bills which involved no additional expense to the government and did not act on physical education bills which contained clauses for federal funds.

5. That war has been the impelling force which has provoked the introduction of both military training and physical training bills.

6. That following World War I there was a trend away from the introduction of the military training type bill, and toward the introduction of bills to provide for physical training.

7. That there has been no positive expression on the part of Congress which reflected unwillingness to provide for physical fitness through a program of physical education in the schools.

Reading Difficulty Differences of Health Knowledge Tests

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SHOULD we improve our health education tests? The answer must be affirmative, unless we take the position that the tests now in use are faultless. Obviously the first steps in improvement should be concerned with the discovery of weaknesses in construction of the tests in which we are interested.

The author became actively interested in the study of differences in reading-vocabulary difficulty as an element in instructional and testing material approximately fifteen years ago.[1] Since that time, reading-vocabulary burden studies have been among the objective studies made of the thirteen known health education test forms in common use. The results of these investigations seem sufficiently significant that other workers in health education may be interested. The application of sound principles of construction to health education tests is of importance if they are to perform their proper function of improving the "learning for health" program.

THE PROBLEM

The principal problem of this research study has been to discover whether two commonly used health education tests vary significantly in reading-vocabulary difficulty.

Subsidiary problems arising during the study concerned the development and adaptation of formulae and of other techniques for comparing the reading-vocabulary difficulty—also referred to as vocabulary burden—of the two tests.

PROCEDURES FOLLOWED

Step 1.—Two standard health knowledge tests[2] were selected as original sources for the investigation. In this report they are referred to as Test X and Test Y.

Step 2.—Thorndike's *Teacher's Word Book* (1927), was

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1 W. W. Patty, and W. I. Painter, "Improving Our Method of Selecting High School Textbooks," *Journal of Educational Research*, June, 1931; W. W. Patty, and W. I. Painter, "A Technique for Measuring Vocabulary Burden of Textbooks," *Journal of Educational Research*, September, 1931.

2 The names of these tests are omitted because this report is not made for the purpose of discrediting the tests concerned. Rather, a procedure for measuring reading-vocabulary burden of health education tests is presented, and a difference in reading-difficulty between the two tests used in grades 7 and 8 is shown.

selected as the source for credit-numbers, "C," for words appearing in each test. These credit-numbers are based upon commonness or frequency of appearance of each word in published literature.

Step 3.—An alphabetical list of all words appearing in each test was made.

Step 4.—The words in each test were counted to get the total number, "N," of words in each test.

TABLE I

THE "A" SECTION OF WORK SHEET FOR TEST X*

W (Word)	*C (Credit-Number)*	*F (Frequency)*	*WWV (Word Weighted-Value)*
about	172	8	1376
above	101	2	204
across	84	3	252
advice	30	1	30
afraid	54	1	54
after	158	2	316
afternoon	59	1	59
again	151	1	151
age	71	1	71
aid	47	1	47
air	91	8	728
all	203	4	812
alone	89	1	89
always	94	2	188
amount	51	5	255
angry	47	1	47
another	116	3	348
answers	91	5	455
anyone	20	1	20
anyway	14	1	14
appetite	21	2	42
apple	78	3	234
apple sauce	1	1	1
around	95	1	95
ash	23	1	23
ask	94	1	94
attention	35	1	35
automobile	33	2	66
avoid	31	1	31
away	125	4	500

* Space limitations prevent publishing the entire list of words and complete work sheet, but the "a" section illustrates the procedure.

Step 5.—The number of *different* words in each test were recorded—hereafter referred to as the range, "R."

Step 6.—The credit-number, "C," for each word was placed opposite it.[3] The size of the credit-number is in proportion to the frequency of its reading use. For example, the credit-number for "an" is 204 while that for "asparagus" is only 6.

[3] See Table I for example from Test X and Table II for Test Y.

TABLE II

THE "A" SECTION OF WORK SHEET FOR TEST Y*

W (Word)	*C (Credit-Number)*	*F (Frequency*	*WWV (Word Weighted-Value)*
abdomen	5	1	5
able	70	1	70
about	172	8	1376
accidents	26	3	78
accurate	3	1	3
active	24	1	24
advertisements	7	1	7
advertises	12	1	12
after	158	3	474
afternoon	59	1	59
aid	47	1	47
air	91	2	182
airy	13	1	13
alcoholic	1	1	1
ale	10	2	20
alkali	1	1	1
all-day	1	1	1
along	99	1	99
always	94	1	94
amounts	51	7	357
amusing	1	1	1
annual	26	1	26
answers	91	5	455
anyone	20	1	20
anyway	14	1	14
apples	78	1	78
apply	36	1	36
around	95	2	190
articles	52	1	52
ask	94	1	94
asking	1	1	1
average	24	2	48
avoidance	1	1	1
away	125	2	250

* Space limitations prevent publishing the entire list of words and complete work sheets, but the "a" section illustrates the procedure for Test Y.

Step 7.—The frequency of occurrence, "F," of each different word in each test was ascertained and the appropriate number placed in the third column.[3]

Step 8.—The credit-number for each word was multiplied by its frequency to obtain the word-weighted value, "WWV," of that word in each test. $C \times F = WWV$. The result was placed opposite each word in the third column of the tables.[3]

Step 9.—The word-weighted values for each test were summated to give the total word-weighted value, "TWWV," of each test.

A large number representing the total word-weighted value of

a test indicates: (1) that the words used are very frequently met by readers and therefore are easy reading material, or else (2) the test includes an unusually large number of words.

Step 10.—The total word-weighted value for each test was divided by the number of words in that test to give the average word-weighted value, "AWWV," for each test. $\frac{TWWV}{N} = AWWV.$ These were compared.

While the total word-weighted values of two different tests might be identical, it seems that a correct comparison of their reading difficulties should take into consideration also the number of words in each test. It would seem that, other factors being approximately equal, the test containing more words would require more mechanical perception adjustments and would therefore have a heavier vocabulary burden. On the other hand, a test composed of difficult words might have a large TWWV only because it contains many words. Since the formula for determining AWWV tends to neutralize the factor of number of words, it would seem to possess higher validity for comparative purposes. If the average word-weighted values of two tests are compared, the larger AWWV is associated with the test that is easier to read.

Step 11.—The average word-weighted value for each test was divided by the range-ratio or the ratio of the number of *different* words to the total number of words, in that test resulting in an index of reading familiarity, "IRF." $\frac{AWWV}{r\ r} = IRf.$ These were compared.

It is believed that the variety of words constitutes a factor of difficulty in reading. If two different tests contained the same number of words, they might not be of equal reading difficulty, even though the TWWV of each were equivalent to the other. The test having the greater number of *different* words should be more difficult to read because it would contain more word concepts. In order to recognize this factor of range of understanding required, IRf, the index of reading familiarity, was developed. The weightings used are such that the greater the number representing the index of familiarity, the greater is the familiarity of the words; hence, the smaller the IRf, the greater the reading difficulty and the heavier the vocabulary burden.

EXAMPLE OF PROCEDURE APPLIED TO INDIVIDUAL QUESTIONS

It is thought that the application of procedure applied to individual questions from the two tests may be of interest. The sixteenth

question of Test X and Test Y have been selected at random to illustrate the technique used.

X16 Question.—If you are afraid the water you have to drink is not pure, the best thing to do is to

a. Boil it. ———a.
b. Let it stand in a pitcher in the icebox two hours ———b.
c. Let it stand in a wide pan in the sunshine an hour. ———c.
d. Put some pieces of ice in it ———d.
e. Drink no water. ———e.

Y16 Question.—A good thing to do to prevent the nervous system from being overfatigued is to

a. Get three hours of sleep before midnight and a total of at least ten hours of sleep every twenty-four hours. ———a.

b. Stay up until eleven or twelve o'clock during school days but sleep late on Sunday morning. ———b.

c. Have the loud-speaker or the radio turned on most of the time. ———c.

d. Take alcoholic beverages and other drinks that are said to "quiet the nerves." ———d.

e. Experience intense and long-continued emotional enjoyment as often as possible. ———e.

X Question

W	*C*	*F*	*WWV*
a	208	2	416
afraid	54	1	54
an	181	1	181
are	183	1	183
best	107	1	107
boil	37	1	37
do	180	1	180
drink	79	2	158
have	194	1	194
hour, hours	105	2	210
ice	61	1	61
icebox*	1	1	1
if	178	1	178
in	211	5	1055
is	187	2	374
it	199	4	796
let	132	2	264
no	181	1	181
not	203	1	203
of	205	1	205
pan	34	1	34
pieces	91	1	91
pitcher	19	1	19
pure	53	1	53
put	131	1	131

* Words not listed in Thorndike's *Teacher's Word Book* were given a credit-number of "1."

some	181	1	181
stand	118	2	236
sunshine	34	1	34
the	208	4	832
thing	157	1	157
to	208	3	624
two	151	1	151
water	139	2	278
wide	89	1	89
you	188	2	376

X16 Q Computation

X16 Q — N = 55

X16 Q — f = 35

$$\text{X16 Q} \text{ — rr} = \frac{r}{N} = \frac{35}{55} = .6363$$

TWWV (Σ WWV) = 8,324

$$\text{AWWV} = \frac{\text{TWWV}}{N} = \frac{8{,}324}{52} = 151.34$$

$$\text{IRf} = \frac{\text{AWWV}}{rr} = \frac{151.34}{.6363} = 237.8437$$

Y Question

W	*C*	*F*	*WWV*
a	208	2	416
alcoholic	1	1	1
and	210	3	630
are	183	1	183
as	204	2	408
at	203	1	203
before	159	1	159
being	91	1	91
beverages	1	1	1
but	196	1	196
days	176	1	176
do	180	1	180
drinks	79	1	79
during	96	1	96
eleven	28	1	28
emotional	1	1	1
enjoyment	7	1	7
every	151	1	151
experience	40	1	40
from	195	1	195
get	136	1	136
good	168	1	168
have	194	1	194
hours	105	3	315
intense	9	1	9
is	187	1	187
late	98	1	98
least	59	1	59
long-continued	1	1	1

Y Question

W	*C*	*F*	*WWV*
loud-speaker	1	1	1
midnight	40	1	40
morning	102	1	102
most	125	1	125
nerves	16	1	16
nervous	15	1	15
o'clock	45	1	45
of	205	5	1025
often	86	1	86
on	200	2	400
or	181	1	181
other	168	1	168
overfatigued	1	1	1
possible	59	1	59
prevent	42	1	42
quiet	62	1	62
radio	3	1	3
said	115	1	115
school	104	1	104
sleep	92	3	276
stay	84	1	84
Sunday	49	1	49
system	41	1	41
take	162	1	162
ten	90	1	90
that	209	1	209
the	208	5	1040
thing	157	1	157
three	136	1	136
time	183	1	183
to	208	4	832
total	37	1	37
turned	1	1	1
twelve	56	1	56
twenty-four	1	1	1
until	108	1	108
up	186	1	186

Y 16 Q Computation

Y16 Q —— N = 86

Y16 Q —— r = 66

$$\text{Y16 Q —— rr} = \frac{r}{N} = \frac{66}{86} = .7674$$

TWWV (ΣWWV) = 10,352

$$\text{AWWV} = \frac{\text{TWWV}}{N} = \frac{10{,}352}{86} = 120.38$$

$$\text{IRf} = \frac{\text{AWWV}}{rr} = \frac{120.38}{.7674} = 156.8673$$

IRf of X16 Question = 237.8437

IRf of Y16 Question = 156.8673

237.8437 — 156.8673 = 80.9764

Using the IRf of Y16 Question as a base $80.9764 \div 156.8673 = .5162$ fraction of superiority in case of reading of X16 question over Y16 question. In other words the text of X16 is 51.62 per cent easier reading than Y16 question.

DATA AND COMPARISON OF THE TWO TESTS

Test X

XN = 1737
Xr = 627

$$Xrr = \frac{r}{N} = \frac{627}{1737} = .3609$$

WWV = C × F (for each different word)
TWWV = Σ(WWV) = 166,144

$$AWWV = \frac{TWWV}{N} = \frac{166,144}{1737} = 95.64$$

$$IRf = \frac{AWWV}{rr} = \frac{95.64}{.3609} = 265.0041$$

Test Y

YN = 1595
Yr = 611

$$Yrr = \frac{r}{N} = \frac{611}{1595} = .3830$$

WWV = C X F (for each different word)
TWWV = Σ(WWV) = 118,144

$$AWWV = \frac{TWWV}{N} = \frac{118,144}{1595} = 74.53$$

$$IRf = \frac{AWWV}{rr} = \frac{74.53}{.3830} = 194.5953$$

These data permit comparison of vocabulary burdens of these two tests on three bases, enumerated hereafter.

1. Total Word-Weighted Values:
   TWWV of Test X = 166,144
   TWWV of Test Y = 118,877

Comparing Test X to Test Y it is apparent that X includes words in more common use than Y, and hence the higher credit-numbers result in a larger TWWV for Test X. The degree of preference of reading familiarity of Test X over Test Y is shown by the following mathematical procedure.

166,144 — 118,877 = 47,267
47,267 ÷ 118,877 = .3976—the fraction of superiority in case of reading based upon TWWV.

Since Thorndike's credit-number weighting of words has been accepted as a valid measure of the commonness or familiarity of

words, the results of the foregoing computation indicate that the words of Test X constitute 39.76 per cent easier reading than those of Test Y on the basis of comparison of the total word-weighted values of the two tests.

2. Average Word-Weighted Values:
   AWWV of Test X = 95.64
   AWWV of Test Y = 74.53

If we accept the importance of the neutralization of the factor of number of words, then a comparison of these tests on the basis of AWWV has significance.

95.64 — 74.53 = 21.11
21.11 ÷ 74.53 = .2832—the fraction of superiority in case of reading based upon AWWV.

Therefore a comparison of the average word-weighted values of the two tests indicate that the words of Test X constitute 28.32 per cent easier reading than those of Test Y. When this percentage of superiority of reading ease is compared to the 39.76 per cent of superiority of Test X over Test Y based upon total word-weighted values, it is apparent that the total number of words in a test is a vital factor in determining vocabulary burden. Both comparisons, however, show that the words in Test X are in more common use and hence easier to read.

3. Index of Reading Familarity:
   IRf of Test X = 265.0041
   IRf of Test Y = 194.5953

If it is agreed that the number of different words in a test or range (r) is a significant factor in reading difficulty, then a comparison of the indices of reading familiarity of the two tests is the most discriminating measure.

265.0041 — 194.5953 = 70.4088
70.4088 ÷ 194.5953 = .3618—the fraction of superiority in case of reading based upon IRf.

It is evident that the inclusion of the factor of range of words affects the comparison of vocabulary burden. By comparing the TWWV of Test X to the TWWV of Test Y, it was found that Test X was apparently 39.76 per cent easier reading. By comparing the AWWV of Test X to that of Test Y, it appeared that Test X was 28.32 per cent easier reading. Finally by comparison of the IRf of Test X to that of Test Y, it was shown that Test X was 36.18 per cent easier reading than Test Y. The IRf appears to qualify as the most discriminating measure. On the basis of comparison of the indices of reading familiarity, the words of Test X constitute 36.18 per cent easier reading than those of Test Y.

CONCLUSIONS

1. The principal question, serving as the major problem of this research project, as to whether or not these two health education tests, planned for the same school classes, differ in vocabulary burdens is answered in the affirmative. The words of Test X are found by objective measurement to be from 28 per cent to 39 per cent easier reading than those of Test Y, depending upon what basis of comparison is used.

2. The number of words in a health education test should be considered in determining vocabulary burden because of the factor of mechanical perception adjustments involved.

3. Neutralization of the effect of the number of words in a test affects the statistical comparison of the vocabulary burdens of tests.

4. The number of word concepts in a health education test, dependent upon the number of *different* words therein, affects its vocabulary burden.

5. The index of reading familiarity, which takes into account the number of words and number of *different* words in a test as well as commonness of reading use, is the most discriminating measure of vocabulary burden.

6. That a test is valid when it tests what it purports to test is a principle generally accepted by workers in the field of measurement. It is recognized that test elements irrelevant to the factor being measured should be reduced to minimum difficulty, or the validity of the test of the pertinent factor will be reduced. Since these health education tests are in printed form, it is apparent that the reading-vocabulary burden of the text is an irrelevant element, with the exception of health knowledge terms. Since this investigation reveals that Test Y presents a vocabulary burden more than 28 per cent heavier than Test X, it is obvious that the vocabulary burden of the two tests has not been equated and a lower validity of the tests as measures of health knowledge results.

7. Words, other than necessary scientific terms, used in presenting questions in health education tests should be chosen from the vocabulary common to pupils of that degree of general educational advancement.

A Score Card for Evaluating Physical Education Programs for Physically Handicapped Children

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CHILDREN whose bodies have been affected by some pathological conditions are hampered in normal physical activity or ambulatory power. Since physical education, by various means, has been undertaken for these children for a number of years, a means of evaluating these programs appears to be desirable.

THE PROBLEM

The purpose of this study was (1) to determine the needs of the physically handicapped child in the field of physical education; (2) to discover a public school program which would satisfactorily meet these needs; and (3) to present this material in the form of a score card usable in evaluating the program of public school systems.

IMPORTANCE OF THE STUDY

While the exact number of handicapped children is not available, surveys indicate that it is great enough to warrant serious attention to those factors which affect the social adjustment and future economic independence of these children. The academic education of these children has been the object of considerable research; it is no less important to study their physical education. The physically atypical need the same kind of skeletal, muscular, and nervous development as others of their relative age. Since the very nature of their affliction discourages their securing physical activity without guidance, the physical education program provided for them is important.

PROCEDURE

The field for this study was limited to crippled and delicate children; the blind and hard of hearing were not considered.

The literature was carefully studied to determine the accepted needs of handicapped children in the field of physical education and the means suggested by the authorities for fulfilling these needs. Some of the most helpful sources studied are included in the appended bibliography.

The literature indicated some divergence of opinion as to the respective parts corrective exercise and adapted sports should play in the public school program.

It was pointed out that children have been doing so-called "corrective exercises" for conditions that could not be corrected appreciably by such routines. It was further pointed out that many children have been given "rest" or "restricted exercise" programs and no thought given to the social, recreational, or leadership value to be gained through physical education. Modified or adapted sports programs were outlined which provide a program as nearly like that given "normal" children as possible.

The divergence of opinion expressed in the literature regarding the requirements for an adequate program in physical education for handicapped children suggested the need for further study. A questionnaire was therefore drawn up to include, as nearly as possible, all points mentioned in the literature. The questionnaire was then sent to thirty authorities in the field asking for their suggestions as to what should constitute a physical education program for these children.

RESULTS OF THE QUESTIONNAIRE

In studying the replies of the authorities, it was most interesting to note that there was, as a rule, more difference of opinion among members of a profession than there was among professions. In no case did one profession agree on a standard which was disapproved by another. Considerable difference of opinion on some standards was anticipated, but it was not found.

The thirty replies were studied, tabulated, and listed in score-card form. The score card was tried in studying the physical education program for handicapped children in the Los Angeles public schools and was found usable in evaluating that program.

While it was necessary to select a jury cognizant of school and physical education problems as they concern the handicapped, it was also necessary to include some authorities whose relationship with the handicapped was such that they could look at the matter objectively rather than with the strongly sympathetic attitude found in those working largely with the handicapped.

Three medical doctors, two of them well known orthopedic surgeons, and one head of the health department for a city school system, answered the questionnaire. Six registered physical therapy technicians answered. Two of these were directors of schools of physical therapy approved by the American Medical Association, two were heads of physical therapy departments in hospitals, two were employed in public health work, one was doing research on a national scale in physical therapy, and one was head of a physical

education program for handicapped children in a city school system. Six professors or associate professors in the physical education field especially interested in corrective work replied. Nine school administrators answered the questionnaire. These included two superintendents, three principals of public schools, the principal of a high school for the handicapped, the principal and assistant principal of an elementary school for the handicapped, and the director of child welfare in a city school system. Supervisors of corrective physical education for one city system and one state department replied. Four high school teachers of corrective physical education answered.

HANDICAPPED CHILDREN'S PHYSICAL EDUCATION CURRICULUM

Score Card

Method of Scoring

Each statement on the score card is allowed a maximum score of 3.0. If the school meets the requirement in a superior-ideal manner, the score is 3.0. A score of 2.0 indicates good-average; 1.0 indicates fair-minimum; 0 indicates that the program fails to meet the item required.

The total score possible is 102. A school scoring 90-102 would be superior; 80-90, good; 70-80, fair; and below 70, poor.

A. *Administration*

1. (a) The program is under the department of health and corrective physical education if the child attends regular school; (b) the program is under the department of special education, in cooperation with the department of health and corrective physical education, if a child attends a special school.

2. The school physician examines all children whom parents, classroom teachers, or family physicians report as handicapped.

3. The school system provides an annual physical examination by a physician for all physically handicapped children.

4. Examination by a physician of all physically handicapped children is required for admission to special schools or to public schools which the child has not previously attended.

5. A permanent, continuous, progressive health record is maintained for each handicapped child by the physical education department and used as a basis for determining his physical education program and is readily accessible to principal and counselor for advising him in other activities.

6. The school health program is closely coordinated with both the general educational and the physical educational program.

7. Handicapped children are classified for physical education according to their ability to participate in activities and according to the program most apt to benefit them socially and physically.

8. Children whose condition requires special attention should be segregated in special schools or classes only so long as this is best for their social and physical good.

* In the original study space at the right-hand side was left for scoring

B. *Personnel*

1. Physical education teachers for handicapped children are college physical education majors.
2. These teachers have had special training, preferably a full course in physical therapy technique, in handicapping conditions and activities suited to them.
3. The school physician approves of the routine program of physical education activities, but is required to approve of activities in only such individual cases as the teacher may bring to him for counsel.

C. *Services*

1. In addition to the general health instruction offered to all children, physically handicapped children receive special instruction regarding their particular health problem.
2. An individual conference is arranged for each child with a responsible person familiar with his condition to be sure that his physical and emotional needs are understood and that he understands what is being done for him.
3. The physician selected by the parents is asked to approve, by means of a form provided by the school and taken to him by the parents, all physical education activities of the handicapped child.
4. The physical education program for the handicapped child never includes activities known to be disapproved by the family physician.
5. Any suggestions of activities or exercise routines made by the family physician and approved by the school physician are included in the program of the handicapped child.
6. Change in the child's condition should be noted by a regular physical examination by the school physician and by screen check-ups made by the physical education teacher.

D. *Activities*

1. The school physical education program includes the correction of simple postural faults.
2. Correction of more serious physical deviations (paralysis, club foot, etc.) is not attempted.
3. Occupational and physical therapists, working under the direction of a physician, are provided for those needing this care.
4. The program is as near that offered normal children as the handicapped's condition will allow.
5. Corrective exercises are offered only if there is likelihood that the exercises will actually correct or at least greatly relieve the condition and then not to the exclusion of all other physical education activities.
6. Rest is offered for those needing it for a few weeks or months to facilitate recuperation from an acute condition, but not as a substitute for physical activity unless any form of physical activity, even checkers, would be detrimental to the child's health.
7. The health of the child's body is considered as much the school's concern as is the education of his intellect.
8. Physical education activities are planned to have corrective or ameliorative value wherever possible.
9. Activities are chosen which will not aggravate the handicapped and which reduce to the minimum the possibility of accidental injury.
10. Some activities are chosen because of their definite recreative value and carry over possibilities for adult life.

11. Some of the activities offered encourage gradual participation in group action.
12. Adapted sports are included.
13. Opportunity for group recognition and approval is afforded.
14. Safety training is included.
15. Success achieved by other handicapped people is included as a matter of incidental teaching.
16. Several recreational skills are learned by each handicapped child through his school physical education program.

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A Selected Bibliography on the Planning and Construction of Facilities for Physical Fitness Activities, 1929 - 1944

By Louis C. Schroeder

Washington 25, D. C.

THIS selected bibliography on the planning and construction of facilities for physical fitness activities has been developed in response to the many hundreds of requests that have been received by this office for information and help on Living War Memorials which would honor the men and women who participated in World War II. Also, for others who seek information on the planning and construction of indoor and outdoor facilities which would serve as a means of raising the physical fitness index of our nation.

Key to Abbreviations

Am—American	meas—Measured
Arch—Architect	no—Number
Biblio—Bibliography	p—Page
Bul—Bulletin	pt—Part
Co—Company	pub—Publication
Corp—Corporation	rev—Revised
Diag—Diagram	sup—Supplement
Ext—Exterior	tab—Table
Il—Illustration	univ—University
inc—Incorporated	v—Volume
int—Interior	w—Weekly

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GOVERNMENT AND PRIVATE AGENCIES

The following is a list of governmental and private agencies from which help may be obtained:

American Association for Health, Physical Education, and Recreation, 1201 16th St. N.W. Washington, D. C. Dr. Ben Miller, Executive Sec'y-Treas.

Bear Mountain State Park, Miss Ruby Joliff, Secretary, New York.

Boy Scouts of America, 2 Park Avenue, New York, New York.

National Recreation Association, Howard Braucher, President, 315 Fourth Avenue, New York 10, New York.

MANUFACTURING COMPANIES

The following is a partial list of manufacturing companies that have prepared informative material on the planning and construction of facilities for physical fitness activities:

Brunswick-Balke-Collender Company, 623 South Wabash Avenue, Chicago, Illinois.

Horn Manufacturing Company, Fort Dodge, Iowa.

The J. E. Porter Corporation, Ottawa, Illinois.

Fred Medart Manufacturing Company, St. Louis, Missouri.

The Narragansett Machine Company, Providence, Rhode Island.

Wilson Athletic Goods Manufacturing Company, 2037 North Campbell Avenue, Chicago, Illinois.

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Pencil P—*Pencil Points,* Kenneth Reid, Editor, Rheinhold Pub. Corp., 330 W. 42nd St., New York, N. Y.

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Status of the Graduate Faculty in Physical Education

By Jack E. Hewitt

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IT has often been said that the most important single factor in the development of satisfactory graduate work in a higher institution is a well trained staff. It is generally accepted that the degree of excellence of an institution is determined to a large extent by its instructional staff; that the quality of the service rendered by an individual staff member is conditioned very largely by his training, experience, scholarly activities, and personal traits.

The purpose of this study is to determine whether:

1. Higher institutions offering graduate work in physical education set forth any requirements for the faculty as a prerequisite for teaching courses open to graduates only, or to both graduates and qualified undergraduates.

2. Accrediting associations and national professional organizations interested in the status of graduate work make any recommendations for the graduate staff.

3. The graduate faculties in physical education rate well or not according to the suggested staff requirements set forth by various higher institutions and national associations.

This study was limited to those higher institutions in the United States offering major specialization in physical education leading to advanced degrees. There are 56 institutions that offer the graduate major and grant a master's degree upon completion of work. Twenty schools confer the doctor's degree.[1]* Catalogues of all these institutions were utilized, and in addition a questionnaire was sent to them all. Personal visits were made to all higher institutions in California, Oregon, Washington, and Idaho.

As to whether or not higher institutions set forth any prerequisites for the faculty in order that they may be eligible to teach courses open to upper-division and graduate students, it is generally found that no set requirements are made. The present study found that of the 42 schools reporting, 23 did not set up any professional-rank requirements (rank or title), 23 had no degree prerequisite, 27 stipulated no particular type of experience, and a like number stated no professional-leadership requirement. Thirty-one schools reported that publication was not mandatory, and 26 that research

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This article is an abstract of one chaper of a doctor's dissertation mentioned in reference 1 at end of article.

* Superior figures refer to bibliography at end of article.

was not essential. Twenty-nine institutions do not demand that their staffs have membership in learned professional societies, and 31 do not require them to broaden themselves by travel. On the other hand, a few of the institutions did set up definite requirements. Eight schools do require at least the rank of Assistant Professor and 12 demand at least the master's degree. Only 4 schools reported that the doctor's degree was necessary. Eight institutions reported that they required some leadership in the profession and 10 required research as a prerequisite. Six schools stated that membership in learned societies was recommended. (Refer to Table I.)

TABLE I

INSTITUTIONS STATING QUALIFICATIONS FOR TEACHING AT THE GRADUATE LEVEL

Stipulated Requirements	*Upper Division and Graduate Courses*		*Graduate Courses Only*	
Rank:				
Professor	0	0	0	0
Associate Professor	1	2	3	7
Assistant Professor	8	19	7	16
Instructors	5	11	3	7
No particular rank requirements	23	55	22	54
Degree:				
Doctor's Degree	4	9	8	19
Master's Degree	12	28	8	19
Bachelor's Degree	1	2		
No degree required	23	55	22	54
Years of experience:				
Six years' experience			1	2
Five years' experience	2	5	1	2
Four years' experience	2	5	1	2
Two years' experience	1	2		
Some years' experience	1	2	2	5
No time stipulated	27	64	25	59
Leadership:				
Leadership in profession required	8	19	3	7
No leadership in profession required	27	64	24	57
Publications:				
Publications required	3	7	3	7
Publications not required	31	75	25	59
Research:				
Research required	10	23	7	16
Reesearch not required	26	61	23	54
Membership in Societies:				
Membership in learned societies required	4	9	4	9
Membership in learned societies not required	29	69	24	57

National meetings:				
Required to attend national meetings	5	11	5	11
Not required to attend national meetings	29	69	24	57
Travel:				
Travel required	2	5	1	2
Travel not required	31	73	27	64

Practically the same situation was found in regard to qualifications set up for teaching only graduate students as was found above. Of the institutions offering the graduate major, 22 reported that they did not set up any professional-rank requirements, 7 required the rank of Assistant Professor, and 3 stipulated the rank of Associate Professor or above. With regard to the degree that must be held, it was found that 22 schools specified no particular degree requirements. Eight institutions, on the other hand, indicated that they require the teacher to hold the master's degree, and a like number stated that they demand the doctor's degree. Three schools reported that they require their faculty to exhibit leadership in the profession, and a like number required some publication of original material as a qualification. Research activity was required by 7 schools.

Various accrediting agencies and national professional associations in the United States agree that the instructors engaged in graduate teaching should exemplify a high quality of teaching, scholarship, research, hold professorial rank, and possess the doctor's degree. The North Central Association committee report on graduate degrees recommends the following concerning the graduate faculty:

> No institution should confer the master's degree in any subject in which the directing professor has not (a) adequate training in his subject, and (b) adequate time to supervise graduate work. Generally speaking, the directing professor should have the Ph.D. degree or the full equivalent and, to the extent to which he conducts or supervises graduate work, he should be relieved of the normal load of undergraduate instruction.[2]

The National Association of State Universities and the American Association of Teachers Colleges both recommend that the graduate faculty possess the doctor's degree.[3, 4] Dean R. B. Munford, in discussing graduate work, summed up the problem when he said,

> It would seem to be self-evident that a man of limited experience who has not himself been trained in graduate work cannot be fully qualified to direct others in advanced study.
>
> It is conceivable that a man of large experience and successful achievement in scientific research might direct a group of graduate students, but it is difficult to understand how the inexperienced man, without advanced training, can satisfy the requirements which should obtain in a graduate faculty.
>
> If our institutions are to maintain their place among higher institutions of learning, then we must insist upon a higher appreciation of scholarship and must develop among ourselves and our faculties the scholarly point of view.[5]

A. J. Klein in his 1930 report of Land-Grant Colleges and Universities and the National Association of State Universities stressed the importance of scholarship on the part of the graduate

staff and the fact that this should be exemplified by research and publications.[6, 7] The American Association of Teachers Colleges likewise felt that the graduate faculty should make significant contributions, participate in appropriate professional organizations, and possess the power to guide and stimulate students to scholarly attainments.[4]

ANALYSIS OF THE GRADUATE FACULTY IN PHYSICAL EDUCATION

Types of Experience.—Thirty-eight higher institutions reported that the larger part of their staff's previous experience had been varied or "mixed." The term "mixed" means that the teacher's experience prior to his teaching at the graduate level may have been in teaching game skills or sports at the undergraduate level, teaching undergraduate professional courses, teaching some graduate professional courses, or assisting students with research. In the institutions answering the questionnaire pertaining to the experience of graduate staff members, 112 faculty members or 36 per cent indicated that their past experience had been "mixed." Twenty-two per cent or 70 faculty members indicated that their past experience had been mainly in teaching theory courses to either graduates only or both graduates and qualified undergraduates. Forty-six staff members indicated that their former experience had been in teaching undergraduate theory courses and some coaching courses at the undergraduate level. About the same number (42 staff members) indicated that their experience had been gained in teaching undergraduate professional courses, while 37 members or 11 per cent had taught game-activity skills or coaching. Only 3 per cent or 10 members who are now teaching graduate courses in physical education reported that they had gained most of their experience by teaching graduate professional courses, while 8 persons said that most of their past experience had been in advising and assisting students in research.

TABLE II

TYPES OF EXPERIENCE OF 322 GRADUATE-FACULTY MEMBERS IN PHYSICAL EDUCATION (38 INSTITUTIONS)

Types of Experience	*Number of Faculty*	*Per cent*	*Rank Order*
1. Most of past experience has been in activities—game skills, coaching, etc.	37	11	5
2. Most of past experience has been in teaching undergraduate professional courses	42	13	4
3. Most of past experience has been in teaching undergraduate courses and in coaching	46	14	3
4. Most of past experience has been in teaching undergraduate and graduate professional courses	70	22	2

5. Most of past experience has been in teaching graduate professional courses	10	3	6
6. Most of past experience has been in advising and assisting students in research	5	1	7
7. Most of past experience has been "mixed" (combination of items listed 1 to 6)	112	36	1

Ranks of Graduate Faculty.—Two divisions were made under this heading: (a) the present rank of the staff engaged in teaching courses open to graduates only, and (b) the present rank of those teaching courses open to both qualified undergraduates and graduates.

Of the 182 faculty members reporting that they were engaged in teaching courses open to graduate students only, it was found that 38 or 21 per cent hold the rank of instructor, while 54 or 29 per cent are Assistant Professors. There are 39 faculty members or 22 per cent which hold the rank of Associate Professor, and 44 members or 24 per cent are full professors. (Refer to Table III.)

TABLE III

RANKS HELD BY FACULTY MEMBERS TEACHING COURSES OPEN TO GRADUATES AND QUALIFIED UNDERGRADUATES

Rank of Faculty	*Combined Upper-division and Graduate Courses*		*Graduate Courses Only*	
	No.	*Per cent*	*No.*	*Per cent*
Professor	78	20	44	24
Associate Professor	68	18	39	22
Assistant Professor	109	28	54	29
Instructor	103	27	38	21
Lecturer, Teaching Assistant, or Teaching Fellow	24	7	7	4
Total	382	100	182	100

Of the 382 graduate-faculty members teaching those courses in physical education open to graduates and qualified undergraduates, it was found that 103 or 27 per cent hold the rank of Instructor, while 109 members or 28 per cent are Assistant Professors. Sixty-eight or 18 per cent are Associate Professors, and 78 or 20 per cent are Professors. There are twice the number of faculty teaching at this level as in courses for graduate students only. (Refer to Table III.)

There seems to be very little difference between the proportions of faculty members of the various ranks teaching those courses open to graduates and qualified undergraduates and those teaching courses for graduates only. It is interesting to note, however, that 4 per cent

more Professors teach graduates only than those teaching graduates and qualified undergraduates.

Degrees Held by Graduate Faculty.—In an analysis of the highest degree held by 423 faculty members teaching courses for graduate credit in 49 institutions reporting, it was found that 6 members or 1 per cent do not hold any degree, while 41 or 10 per cent hold only the bachelor's degree. The highest percentage (54 per cent or 229 staff members) hold the master's degree, while 147 or 35 per cent possess the doctor's degree. (Refer to Table IV.) Of all those holding the different types of masters' degree (229 staff members) about 69 per cent have the M.A. degree and 19 per cent the M.S. Only 1 per cent hold the professional degree of Master of Physical Education. At the doctorate level, there are almost an equal number of those possessing the Ph.D. and the M.D. degree: 16 per cent and 13 per cent, respectively. These findings are similar to those reported by Helen R. Haggarty.[9] She found that, of 233 teachers giving professional courses in physical education for women, 65 per cent held the master's degree, 27 per cent, the bachelor's, and 4 per cent, the doctorate; those holding only a teaching certificate amounted to 1 per cent.

A little over one-third, or 147, of the faculty teaching graduate students in physical education in 49 institutions reported that they hold the doctor's degree. Of a total of 229 staff members who hold

TABLE IV

DEGREES HELD BY 423 FACULTY MEMBERS TEACHING GRADUATE COURSES (49 INSTITUTIONS)

No Degree	Bachelor's Degree			Master's Degree			Doctor's Degree		
No.	*Title*	*No.*	*Per cent*	*Title*	*No.*	*Per cent*	*Title*	*No.*	*Per cent*
	B.A.	20	4.5	M.A.	160	37	Ph.D.	68	16
6	B.S.	15	3.5	M.S.	44	10	M.D.	58	13.5
	B.P.E.	5	1.2	M.Ed.	20	5	Ed.D.	14	3.7
	B.Ed.	1	.2	M.P.E.	5	1.2	D.O.*	3	.7
							L.L.D.	2	.5
Total		41	10.0		229	54	D.P.H.	1	.2
							D.Sc.	1	.2
							Total	147	35.0

DEGREE SUMMARY

Degree Title	*Total Number*	*Total Per Cent*	*Rank Order*
No Degree	6	1	4
Bachelor's	41	10	3
Master's	229	54	1
Doctor's	147	35	2
Total	423	100	

* Doctor of Osteopathy.

the master's degree, 106 or 39 per cent reported that they were now completing work for the doctorate. Approximately 10 per cent indicated that they were working on the completion of the master's degree; however, there were 140 staff members or 51 per cent who were not training for any higher degree. (Refer to Table V.)

TABLE V

PHYSICAL EDUCATION GRADUATE FACULTY IN TRAINING FOR HIGHER DEGREES (49 INSTITUTIONS)

Faculty	*No.*	*Per cent*
Faculty members on Graduate Staff	423	
Those possessing doctor's degree	147	35
Total not holding doctorate	276	65
Those reported in training for doctorate	106	38.4
Those reported in training for master's degree	30	10.8
Total number training for higher degrees	136	49.2
Total number not training for higher degrees	140	50.8

Contributions by the Faculty.—One attainment recommended by some institutions and national associations is that the graduate faculty should make significant contributions exemplified by research and publications.

Of the 49 institutions returning the questionnaires, 22 left the question of contributions blank. It is not known to this writer, therefore, whether faculty members in these institutions have made any significant contributions by writing books, magazine articles, etc. One hundred and ninety-three staff members in 27 schools reported that they had made some contribution in the form of written books or articles. Those in this group of 103 have had from 1 to 5 publications. Forty-eight faculty members replied that they had contributed from 7 to 10 articles or books, while 12 had published 10 to 12. Thirty members said they had written over 20 articles or books.

SUMMARY AND DISCUSSION

The majority of higher institutions with departments of physical education, of which there are 56 offering the graduate major for the master's degree and 20 for the doctorate, do not generally specify any prerequisites for the faculty engaged in teaching courses at the graduate level. Of the 42 schools reporting for this study, only 7 required their graduate faculty to have the academic rank of Assistant Professor or above, and 8 demanded at least a master's degree. A similar number of schools held that the doctor's degree was essential, and 7 set research ability as a prerequisite. Twenty-two did not specify any rank requirements and a like number no degree requirements; 25 stipulated no particular type of experience neces-

sary, and 24, no professional-leadership requirement. Research ability was not considered necessary by 23 schools. Twenty-seven and 24 respectively did not consider travel or attendance at national professional meetings essential for the graduate faculty.

The existing standards for the graduate faculty at most of these 42 higher institutions fall below those recommended by national professional associations and various accrediting agencies. The Association of American Universities, the National Association of State Universities, the American Association of Teachers Colleges, and accrediting groups such as the North Central Association of Colleges and Secondary Schools are quite unanimous in their recommendations for the graduate faculty. In varying degrees they stress teaching ability, knowledge of one's subject, intellectual endowment, personality, capacity for research, scholarship, professional rank, and (last but not least) the possession of an advanced degree, preferably the doctorate.

In an analysis of the types of past experience of 322 faculty members now teaching graduate courses in physical education it appears that the majority of the staff have gained their experience at the undergraduate level. Only 26 per cent reported that their previous experience had been primarily at the graduate level. Thirty-six per cent reported varied experience at both levels, graduate and undergraduate, while 38 per cent specified that their experience had been gained in undergraduate activities or coaching and in teaching undergraduate professional courses. In estimating the adequacy of previous experience as a qualification for teaching graduate courses, it is evident that those possessing limited experience and training at the graduate level are not fully qualified, according to the standards recommended, to direct others in advanced work.

National professional associations and accrediting agencies recommend the rank of Assistant Professor or above for the graduate faculty. Of 382 staff members teaching either graduates or qualified undergraduates, 66 per cent have the rank of Assistant Professor or above, while of 182 members teaching graduate students only 75 per cent have the rank of Assistant Professor or above. There seems to be a definite tendency to limit graduate faculties to teachers of professorial rank, although in certain cases teachers of less than professorial rank are admitted. If holding a professorial rank is any standard for teaching at the graduate level, then institutions offering the graduate major in physical education can be considered as a whole as adequately meeting this standard.

Some higher institutions and interested professional and accrediting associations hold that possession of the doctor's degree is one important criterion for the graduate staff. It cannot be said that those holding the doctor's degree always make the best teachers.

Other factors such as personality, technical skill, professional competence, ability to teach one's subject, etc., are all important characteristics of a good teacher. Unfortunate perhaps is the overemphasis given to the Ph.D. as the "union card" for teaching at the college level. In many institutions the Ph.D. has become a research degree with excessive specialization in a narrow field. Too often teachers are apt to reflect immediately the influence of their training and to approach their teaching in a spirit of research, rather than in one of instruction and interpretation. The recent demand for trained teachers as opposed to research technicians has undoubtedly stimulated the newly developed professional degree of doctor of education. The feeling here is that excessive, narrow training in research, which is often a concomitant of the Ph.D., is not necessarily the best training for teaching. Even though the graduate staff must know the intricacies of research, it appears that professional degrees with their emphasis on the broad implications of teaching or administration have considerable merit for teachers of health and physical education.

In a study of the higher degrees held by 423 graduate faculty members in physical education in 49 institutions, a little over one-third or 147 were found to hold the doctorate. Sixteen per cent hold the Ph.D., and 14 per cent, the M.D. Four per cent hold the professional degree in education, the Ed.D. It is the writer's opinion that within the next year or so there will be a great increase of physical educators who obtain their professional doctor's degree in education. This conclusion is based upon the close affiliation that now exists between physical education and education. In a previous study the writer reported that Schools of Education offer 85 per cent of all doctor's degrees, and 51 per cent of all master's degrees, for graduate majors in physical education.[8] According to a tabulation of those teaching graduate courses in physical education, 229 staff members hold one of four types of masters' degrees, and 106 of these indicated that they were completing work for the doctor's degree. However, 51 per cent of the graduate faculty replied that they were not training for any type of higher degree. Only 1 per cent of those teaching at the graduate level did not hold any degree, while 10 per cent hold only the bachelor's degree. If the possession of a higher degree and the great number reported as working for advanced degrees is any indication of adequacy of training for instruction at the graduate level, it can be concluded that graduate staffs in physical education are or soon will be well trained. Since a large percentage of all graduate courses are those which apply toward the master's degree, it can be seen that those faculty members holding only the master's degree have at least as much training as their students who are working for the master's degree.

The making of significant contributions exemplified by research

or by the writing of articles and books was another qualification recommended for the graduate faculty. Twenty-seven schools reported that 193 members of their staffs made contributions by research and writing (from 1 to 20 publications). About half of the institutions left this part of the questionnaire blank. From the sampling obtained it is evident that physical education graduate faculty members have done very little in the way of research or writing magazine articles or books.

Associations and accrediting agencies suggest that ample time be provided for staff members for research, writing, and conferences with students, and that the graduate load for teachers should be lighter than at the undergraduate level. Specifically, the Association of American Universities recommends that teaching schedules in higher institutions should not exceed 16 hours per week, and states that any load over this amount endangers educational efficiency. In the matter of teaching loads, 41 directors or official representatives of physical education recommended that the ideal graduate lecture-course load should approximate 12 hours a week. These same institutions recommended that those teaching undergraduate courses should work one-third more class hours per week than those teaching at the graduate level. It would seem that the teacher of activity courses should teach two hours to every one taught by the teacher of graduate lecture-courses if this standard is to be adhered to.

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Research Abstracts

Prepared by the

NATIONAL COUNCIL OF THE RESEARCH SECTION

ANATOMY AND PHYSIOLOGY

Sheps, Jack G. "The Nuclear Configuration and Cortical Connections of the Human Thalmus," *Journal of Comparative Neurology*, 83:1 (August, 1945).

Human thalmic nuclei show the same general differentiation as those of higher primates. The ventral nucleus is subdivided into anterior, lateral, posteromedial nuclei, the latter three containing large and small cells. Three pathological cases are presented, two involving all the cortical connections of the thalmus and one involving the anterior limb of the internal capsule. In the first two cases the anterodorsal nucleus and the large cells of the nuclei are preserved. Centrum medianum, the reticular, and the other nuclei are degenerated. In the third case there is degeneration of the anteroventral and antemedial nuclei, the small cells of the dorsomedial nucleus, nucleus ventralis anterior, and the medial third of the nucleus ventralis lateralis. The large neurons of the ventral nucleus may be the anatomical site of sensation in lesions involving the parietal lobe, and with the centrum medianum may form most of the thalmo-striate connections.—*The Wistar Institute.*

Taylor, Albert Cecil, "The Rates of Freezing, Drying, and Rehydration of Nerves," *Jr. Cell. and Comp. Physiol.*, 25:3 (June, 1945).

The time course of the temperature change occurring in nerves of various sizes and conditions, when immersed in different chilling solutions, was determined thermo-electrically. The main variables of practical significance are (a) time required for the center of the nerve to reach freezing temperature, and (b) rate of temperature drop within the freezing range. These two values vary independently for different agents and procedures. Under the specific conditions of tissue size and evacuation, the evaporation of water from the tissue ceases after one day at -30°C and after 2 days at -40°C. The small fraction of residual moisture not removable from the tissue at these low temperatures can be further reduced by continuing the evacuation at room temperature.

Dehydration of the dry tissue in Ringer's solution occurs most rapidly when executed in the original vacuum; less promptly after access of air to the tissue even though evacuation is again carried out; and much more slowly in air, particularly during the first period of inbibition. Even with imbibition in vacuo the tissue does not approach its normal water content until after several hours. But it reaches the 50% mark within ca. 2 minutes.—*The Wistar Institute.*

Van Buskirk, Charles, "The Seventh Nerve Complex," *Jr. Comp. Neur.* 82:3 (June, 1945).

Material from thirteen cats, twenty-five dogs, and thirty-five human beings was used for the study of the normal seventh cranial nerve complex in an effort to establish criteria of normality. The morphological characteristics of the complex are described. Measurements and counts of cells and fibers (myelinated and unmyelinated) were made on the facial nucleus, the geniculate ganglion, the facial nerve trunk central and distal to the ganglion, the greater

superficial petrosal nerve and the chorda tympani. Calculations and observations from the data obtained indicate that the human facial nerve is 58% special visceral efferent, 24% general visceral efferent, and 18% sensory; that the dog facial nerve is 75% special visceral efferent, 7% general visceral efferent, and 18% sensory; and that the cat facial nerve is 80% special visceral efferent, 2% general visceral efferent, and 18% sensory. The data indicate the probable presence of cutaneous sensory fibers, but not of sensory fibers to the facial muscles. The presence of a greater number of fibers in the facial nerve trunk peripheral to the ganglion than central to it is demonstrated. Sex or laterality have no influence on the number of cells in the nucleus and except during the first year, age has no influence. The changes in the size of the nucleus are due to changes in amount of interstitial tissue rather than in numbers of cells.—*The Wistar Institute.*

EDUCATION

Davenport, K. S. and H. H. Remmers, "Educational Achievement As Compared With Money Spent On Schools," *School and Society,* 61:1586 (May 19, 1945).

Data were based upon approximately 304,000 young men's scores on the Army-Navy Qualifying Test for Civilians given throughout the United States in public schools, colleges and universities, and private schools.

The test consisted of 150 items in four areas of learning—verbal, science, reading, and mathematics. Total time for the test was 2 hours. Schools ranked in scores as follows:

	Average Score (mean)
Public Schools	68.1
Private Schools	73.4
Colleges	89.0
Total	73.2

The correlation between state mean on A-12, V-12 test, and certain data from Blose and Alves* gave the following results:

State mean and average teacher's salary	.63 ± .06
" " " " total per pupil cost	.77 ± .04
" " " " current per pupil cost	.80 ± .03

It was concluded that, in general, the more that was spent in a state on education both for capital outlay and for current expenses, the more the pupils of the state achieve on such a test as the one given.—*Carolyn Bookwalter.*

Freeman, G. L., "Suggestions for 'Stress' Testing," *Jr. General Psychology,* 32:3-12 (Jan. 1945).

"Stress" testing is used in aviation in the examination of men who are to become combat flyers. The purpose is to get a measure of the behavior of the individual under experimentally induced frustration and stress.

In "stress" testing as described by Freeman a mechanical device is used to present "two simultaneous sensory-motor tasks that are difficult to integrate and to use auditory distraction to disturb the subject." The apparatus is described and the procedure followed in "stress" testing is outlined.

The author suggests that the tests need to be validated in connection with combat flight success. In order for the results to be of value the candidate must realize that the test is important to his future or is a threat to his present security. The author also suggests that a test to coordinate disparate

* David T. Blose and Henry F. Alves. *Statistics of State School Systems, 1939-40, 1941-42.* V. II. Washington, D. C.: Federal Security Agency, 1944.

acts might be so designed that the apparatus gives the total integrative performance score.—*Elizabeth Rodgers.*

Lowshe, C. H., Jr., "A Classroom Exercise for Demonstrating Certain Characteristics of Learning," *Jr. Educational Psychology,* 36:31-45 (Jan., 1945).

The author describes exercises which he has used in the teaching of psychology to illustrate principles of individual differences, the pattern of the learning curve, the effect of practice on individual differences, the relationship between insight and learning, the effect of the acquisition of certain habits on learning, and the role of intelligence on learning.—*Elizabeth Rodgers.*

Smith, Mapheus, "Increase in Homogeneity of Attitudes During a Sociology Course," *School and Society,* 62:1593 (July 7, 1945).

The study is based upon data from seven junior-senior and six sophomore classes taught by the same instructor of sociology over the period, spring 1938-spring, 1943, inclusive. Three attitude objects were selected—the law, the treatment of criminals, and capital punishment. The attitude scores on which the deviations were based were those made on the Thurston tests for attitudes toward these ideas. One form of the test was given during the first two weeks of the course and a second form during the last three weeks.

There was evidence for these three attitudes that attitude homogeneity tends to increase during an elementary sociology course. There was no important sex difference found. There was no time tendency for homogeneity to increase or decrease.

Attitudes toward law and treatment of criminals showed the greatest increase in homogeneity. Students also became more like-minded in attitudes toward the negro. The change in size of attitude score was found to be statistically reliable.—*Carolyn Bookwalter.*

NUTRITION

Anderson, Richmond K. and Daniel F. Milan, "Biomicroscopy of the Eyes in Evaluation of Nutritional Status: Conjunctival Changes," *Jr. Nutrition,* 30:1 (July, 1945).

During a survey of the nutritional status of a rural population of Wayne County, North Carolina, comprising 120 white families and 80 negro families, with a total of 1,010 individuals, a study was made to determine whether there was any correlation between the severity and incidence of conjunctival changes detected in these persons by means of a slit lamp, and the level of vitamin A in their diet or in their blood plasma. No such correlation was observed.

A greater frequency and severity of conjunctival changes were found in negroes than in white persons.—*The Wistar Institute.*

Duel, Harry J., Lois F. Hallman, and Eli Movitt, with the assistance of Evelyn Brown, "Studies on the Comparative Nutritive Value of Fats," *Jr. Nutrition,* 29:5 (May, 1945).

Satisfactory growth and reproduction were obtained over ten generations of rats kept on the following diet: skim milk powder 23.76%, vitamin A-fortified margarine fat 9.24%, ground whole wheat 66.00%, and sodium chloride 1% which is similar to Sherman diet B except that margarine fat is substituted for butterfat. The diet was supplemented once weekly for each rat with 5 mg. of lean meat and of lettuce. The most satisfactory growth was obtained in the tenth generation. Somewhat better results were obtained in the group in which the lineage was through the first litter than in a second series where the lineage was followed through the second litter. It is concluded that a vegetable fat such as margarine can serve adequately in place of butterfat for growth and reproduction on a diet otherwise nutritionally satisfactory.—*The Wistar Institute.*

Melnik, Daniel, Melvin Hochberg, and Bernard L. Oser, "Physiological Availability of the Vitamins," *Jr. Nutrition*, 30:2 (August; 1945).

In vitro tests have indicated that various fish products intended for direct human consumption contain a thiaminase which destroys thiamine in a static test system. Rapid and complete destruction of the vitamin occurred in vitro during incubation of food mixtures containing added thiaminase, as present in raw clams. More than eight times the minimal daily requirement of thiamine was destroyed simply in preparing a homogeneous mash of a daily ration to which both clams and thiamine had been added. The results of the human availability study indicated that an appreciable destruction of thiamine (about 50%) occurred in the gastrointestinal tract following the concomitant ingestion of raw clams. Because other fish products are also consumed in a raw or partially cooked state by man, this finding warrants consideration of the antithiamine principle in fish products as a possible conditioning factor in malnutrition. The application of the thiamine in clams to vitamin B_1 methodology, both biological and chemical, was discussed.—*The Wistar Institute.*

Sarett, Herbert P., and Vernon H. Cheldelin, "Thiamine, Riboflavin and Nicotinic Acid Retention In Preparation of Overseas Hams and Bacons," *Jr. Nutrition*, 30:1 (July, 1945).

A study was made of the retention of thiamine, riboflavin, and nicotinic acid in the preparation of overseas hams and bacons, according to the directions issued for the armed forces. The meats had been more heavily salted than the ordinarily prepared products and required soaking before cooking. Representative samples were taken for analysis at each stage of preparation. The changes in weight were taken into account in calculating vitamin retention. The average results for three whole hams, two sliced hams, and six bacons were as follows: Average retentions of thiamine, riboflavin, and nicotinic acid after soaking and boiling of whole hams were 72, 79, and 79% respectively. Subsequent frying reduced the remaining vitamins to 55, 67, and 68% respectively, whereas after baking the comparable figures were 50, 79, and 71%. Only a small part (a few per cent) of any of the vitamins were found in drippings of the baked ham. Soaking of sliced ham left only 59, 85, and 58%, respectively, of the original thiamine, riboflavin, and nicotinic acid contents. Retentions after frying these slices were 47, 78, and 52%, while after baking 47, 68, and 47%, respectively, of thiamine, riboflavin, and nicotinic acid were found.

The losses of these vitamins on soaking of overseas bacon were large, leaving only 52, 78, and 42% of the original thiamine, riboflavin, and nicotinic acid. The amounts of these vitamins remaining after frying were 20, 72, and 30%, respectively.—*The Wistar Institute.*

PHYSICAL THERAPY

Hellebrandt, F. A., "Analysis of the WAC Emergency Physical Therapy Training Program," *Archives of Physical Medicine*, XXVI:8 (Aug. 1945).

Two groups of students for the emergency training in physical therapy were observed at the University of Wisconsin during successive 6-month periods. The groups were composed of 32 members of the Women's Army Corps and eight civilians. All were volunteers and the majority of the WACS were seasoned trainees well adjusted to the discipline of military life.

The subjects were grouped into four major categories—basic science, medical science, technical subjects, and clinical practice. Analysis was then made of grades made on the examination of the American Registry of Physical Therapy Technicians, which was taken as the most objective test of general knowledge in physical therapy. Frequency histograms were drawn for the

study of spread of grades in the various phases of the training program. There was nothing found in the evidence to indicate significance of superiority on the part of the student with the richest educational background. There was nothing found to indicate that a major in physical education was superior to specialization in social sciences or the humanities for mastery of the material in the physical therapy training program.—*Carolyn Bookwalter.*

Watkins, Arthur L., and Mary A. B. Brazier, "Observations on Muscle Spasms in Poliomyelitis," *Archives of Physical Medicine,* XXVI:6 (June, 1945).

Six patients were studied and each received intensive tests during the acute stages of poliomyelitis. In all, 835 measurements were made. The degree of muscle spasms was measured by the response of the muscle to passive stretching; the stretching technique was standardized to make it comparable from test to test. The muscle spasm in the patients was measured by quantitation of the electrical discharge released on 5 seconds of passive stretching by known weights.

The effects of hot packs, infra-red radiation, luminous heat, short-wave diathermy and the intramuscular injection of prostignine on the electrical component of the spasm was tested. The single applications of infra-red radiation, diathermy, and hot packs had no effect. Patients disliked prostignine because of the effect upon the gastro-intestinal tract, even though it caused a decrease in the spasm of 25%. Luminous heat caused a decrease of spasm equal to prostignine. As an isolated observation it was found that one patient who had no hot packs or other treatment except that of the test and the usual muscle re-education, showed the same degree of improvement in muscle power as did the others in the series.—*Carolyn Bookwalter.*

PHYSICAL EDUCATION

Burns, David, "The Assessment of Physical Fitness," Report, British Association for the Advancement of Science, 3:399-418 (Apr., 1940).

Physical fitness is regarded as one of those "magical phrases which mean so much to us when spoken with a proper solemnity and induces in all who hear a willing suspension of the critical faculty." In attempting to test physical fitness there is "need to avoid building up theories and afterwards turning them into articles of faith."

Comparison of death rates is considered as a means of assessing physical fitness inasmuch as the crude death rate at all ages and in all countries has steadily decreased. However, the more common causes of premature death are not the most frequent causes of illness.

What is the nature of tests which might be used to appraise physical fitness? Somatometric tests are surveyed and eliminated because the relationship between the configuration of the body and fitness lack validity. Breath holding is regarded as the most significant of the physiological measures that might be used. Those tests which depend upon the recuperative power are questioned because of the possibility of overstraining the heart in the unsound. In the last analysis the will to endure and not "die in the last ditch depends upon the adequacy of the secretory mechanism of the adrenal cortex." In the area of psychological tests, work output may be taken as a measure of fitness inasmuch as the fit person carries on his work without an unpleasant degree of fatigue. This is not a satisfactory measure to use when work is unpleasant and movements passive. For example, work on treadmills does not reveal accurately the efficiency of a subject because of the more or less complete lack of interest in the work.

Burns concludes that "one cannot really assess man's efficiency until his whole life story is unrolled."

In commenting on exercise and fitness, Burns quotes a League of Nations' Bulletin as follows: "Up to the present, methods and systems of physical education have not produced any clearly demonstrable effects upon the health of the masses, doubtless because the present state of our knowledge is not yet sufficient to enable us to base them on accurate scientific data."—*Elizabeth Rodgers.*

Clevett, Melvin A., "Industrial Recreation Nights At Worcester," *Journal of Physical Education,* XLII:2 (November-December, 1944).

An analysis of successful industrial recreation nights with a presentation of the "best" events used in 59 such events. These 59 programs were conducted during a two-year period with attendance range of 175 to 1,100 persons. Total participation reached 24,060. Committee organization, self-planning, detailed assignments, and variety of events to appeal to many interests are necessary. Sixteen action pictures portray some of the best events.—*H. T. Friermood.*

Cureton, Thomas K., "Leadership Training In Physical Fitness and Aquatics," *Journal of Physical Education,* XLII:2 (November-December, 1944).

Dr. Cureton has studied the dozen institutes he has conducted for leadership training and here sets forth his findings. He reveals specific deficiencies that are commonly present and indicates the need for training leaders who are qualified to make correction. His findings contain 17 specific suggestions on how to conduct a leadership training institute and 24 specific suggestions on the training program for leadership in advanced swimming and lifesaving. Included is a wartime aquatic bibliography.—*H. T. Friermood.*

Foss, Martin L., "The Past Looks To The Future," Part I, *Journal of Physical Education* XLII:2 (November-December, 1944) (Part II—XLII:3, January-February, 1945).

This is a historical analysis of the trends in YMCA physical education during the past 75 years. The author has been actively engaged in the work for 45 of these 75 years and a diligent student and teacher. He records his findings on the influence of past leaders such as Luther Halsey Gulick, Robert J. Roberts, George J. Fisher, John Brown, Jr., and members of the Physical Education Society of the YMCA. On the basis of his analysis of past problems and administrative procedures carried on by the Society, Mr. Foss outlines preferred steps that now need to be taken.—*H. T. Friermood.*

National Research Council, *"Endurance of Young Men," Society for Research and Child Development,* 1945.

This study was directed by T. K. Cureton and others on his staff at the University of Illinois. Data for the study were collected at the University of Illinois in the testing of 3,000 men on 28 endurance exercises with a portion of the men being tested on some organic condition tests.

The report includes more than 2,000 correlations and much advanced statistical work for predicting performance and for analyzing fundamental constituents of muscular and organic endurance. In this study four types of endurance are reported upon; arm extensor muscles, lateral muscles, limb locomotor muscles, and organic endurance. The principle contribution of the report is to fundamental knowledge about endurance and about tests which measure it.

Testing facilities in the new physical fitness laboratory of the university were used in making the tests.—*T. K. Cureton.*

BOOK REVIEWS

Conditioning Exercises for Girls and Women. Anne Schley Duggan, Mary Ella Montague, and Abbie Rutledge. New York 18: A. S. Barnes & Company, Inc., 1945. 102 pages, $2.50.

With renewed emphasis on physical conditioning, stimulated by the distressingly poor physical condition revealed by the many testing programs carried on during the late war, many schools, faced with an insufficient amount of time for physical conditioning where only games and sports were used, have introduced a section of conditioning exercises into their physical education programs. Owing to the lack of emphasis on this sort of activity in many of our professional schools in the last 20 years, many of these teachers have found it difficult to devise satisfactory programs of this kind of exercise. The authors of this book have set about to help to meet their difficulties and have done a very good job of it.

After giving considerable space to an introduction to the subject of conditioning exercises, badly needed by many of our physical education teachers of today, they have presented 98 different exercises, graded in 8 functional groups, and have then included a whole written section on how to organize these exercises into well balanced days' orders.

The exercises are well chosen to appeal to girls and women. The desire for bodily trimness, for flexibility, and for balance and grace, so common to so many women, have been kept in mind in the selection of exercises. Teachers who are at a loss as to how to organize such conditioning programs should find this book most helpful. Those who do know how to do it will find so much new and stimulating material in the book as to make it worth studying carefully. If well selected and taught, and if kept within the time limits of about a quarter of an hour, this type of exercise has much to contribute to the all-round physical conditioning of girls and women. If presented as intelligently and enthusiastically as is done in this book, it should be, on the whole, as interesting to girls and women as is the sports program.

C. H. McCloy
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Better Teaching Through Testing. M. Gladys Scott and Esther French. New York 18: A. S. Barnes and Co., 1945. 247 pages, $2.50.

This is a first course in tests and measurements designed primarily for girls and young women, although considerable of the material is applicable to mixed groups.

The material is logically arranged on the basis of how tests are used in an institutional situation. The opening chapters deal with the use of tests, followed by the characteristics of good tests and procedures on administration. These materials establish a setting for better understanding of how test materials, now available in physical education and health education, might be used. Measurements are presented which are applicable for an evaluation of sport skill status. Procedures on the evaluation of physcal fitness for women are also presented. This evaluation includes tests of strength, endurance, agility, and flexibility. Presentation is also made of general motor ability and achievement tests.

The chapter on construction of knowledge tests is of particular significance. These materials are valuable aids to workers in physical education and health education as guides in the preparation of test materials.

The text will be of considerable value for all concerned with a test and measurement program in the fields of physical education and health education.

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1 Katherine B. Crisp, *Health for You*, p. 520. (books)

2 Stern, Frances. *Applied Dietetics.* Baltimore: Williams and Wilkins Company, 1943. Pp. x plus 29. (books)

3 Corbin, H. D., "Current Problems in Recreation," *Journal of Health and Physical Education*, 15;6 (June, 1944), pp. 315-16, 353-54. (magazines)

4 Kraines, S. H., and E. S. Thetford. *Managing Your Mind.* New York: The Macmillan Company, 1944. Pp. viii plus 374.

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